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NRAP APPROVED
BJ 9/11/97

PRELIMINARY ASSESSMENT (PA) REPORT
FOR DELTA BRICK
MACON, NOXUBEE COUNTY, MISSISSIPPI
MSD985975473

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL
HAZARDOUS WASTE DIVISION
P. O. BOX 10385
JACKSON, MISSISSIPPI 39289-0385

May 9, 1997

PREPARED BY:

John M. Andrews
JOHN M. ANDREWS

APPROVED BY:

Phillip Weathersby
PHILLIP WEATHERSBY

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Introduction

The Mississippi Department of Environmental Quality, Office of Pollution Control (MS OPC), has conducted a Preliminary Assessment (PA) of the Delta Brick facility located near Macon, Noxubee County, Mississippi. The PA was performed under the authority of the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Location of the facility is Latitude 33° 05' 39" North, Longitude 88° 34' 30" West; NE 1/4, SE 1/4, Section 5, Township 14 N, Range 17 E, Noxubee County, Mississippi (References 3). The elevation of the site is about 175 feet above mean sea level.

Background

Delta Brick (also known as Boral Brick) is located along the western bank of the Noxubee River. It is located about one mile southwest of Macon on Highway 14. The property consists of one large building, a smaller maintenance building, and seven large clay piles all situated on approximately 73 acres (Reference 4). The property is bordered by an unnamed tributary and a marsh to the west, by forest land to the north, by the Illinois Central Gulf railroad to the east, and Highway 14 to the south (References 3 and 4).

Delta Brick-Macon is a kiln dried brick manufacturing plant. As a result of a complaint of the illegal discharge of wastewater from the Delta Brick property, the MS OPC performed a site inspection on October 10, 1990. During this inspection, four soil samples were taken from drainage features on the property which indicated the presence of relatively low levels of lead (see Previous Sampling Investigations paragraph below). In addition, two small unpermitted wastewater discharges were discovered, for which Delta Brick submitted a NPDES permit application to the MS OPC on April 10, 1991. It was determined that additives containing lead had been used to impart color to certain styles of bricks which represented a small fraction of the total production at the plant. Use of such additives was discontinued in 1989; however, waste clay piles present at the site were believed to contain unknown concentrations of lead bearing material. Subsequently MS OPC issued Administrative Order Number 2032 91, dated 13 May 1991, to Delta Brick. This order required Delta Brick to determine the extent of surface and subsurface contamination of lead, chromium, and barium.

Once the draft NPDES permit was issued, MS OPC issued Administrative Order Number 2044 91 to Delta Brick on June 7, 1991. This order required Delta Brick to construct a detention pond and containment dike in order to contain all contaminated water on the plant property until it was diverted to the waters of the state. This requirement of the order was met by using an existing on-site detention pond and constructing the appropriate levees to control the wastewater flow prior to discharge.

Previous Sampling Investigations

In October 1990, two soil samples each were retrieved from the ditch on the north side of the facility and from the ditch on the west side of the facility. The samples had lead concentrations ranging from 160 mg/kg to 704 mg/kg.

During September 1991, sixty-two soil samples recovered on site from various locations and depths were analyzed for barium, chromium, cadmium, and lead. Barium, chromium, and cadmium all recorded low concentration levels. Of twenty-four surface soil samples analyzed, nine had lead concentrations exceeding 250 mg/kg (the soil cleanup level for lead at that time), ranging from 381.8 mg/kg in S-13 to 1,108.5 mg/kg in S-14 (Reference 4). Of thirty-eight soil samples taken at various depths from the clay piles and the four borings (B-1 to B-4), seven samples had lead concentrations >250 mg/kg - <1000 mg/kg, and two were >1000 mg/kg. Sample EYY had the highest lead concentration (1730 mg/kg) at a depth of five feet.

In February 1992, twelve soil samples and five water samples were taken from various locations throughout the site and off-site (the adjacent property to the north - the Nicholson property). All of the samples were analyzed for total lead. Of the off-site samples the soil samples had lead concentrations ranging from 6.7 ug/g to 113.0 ug/g, and the water samples ranged from non-detect in three samples to 7.8 and 13.9 ug/l in the other two samples. The soil samples on-site had lead concentrations ranging from 12.1 to 520.0 ug/g. Also during February, a boring was made in the southeast corner of the Nicholson property. Soil samples retrieved from depths of 0.5, 1.0, and 1.5 feet had lead concentrations of 23.4 ug/g, 10.2 ug/g, and 129.0 ug/g, respectively.

In April 1992, it was discovered through the county tax assessor's property map of the area that Delta Brick/Boral Brick's property line extended 660 feet farther to the north. This meant that sediment runoff from the clay piles on the brick plant property was confined to Delta/Boral's property.

During August, September, and October 1993, clay piles A, B, and D were sampled for lead concentrations. Each pile was augured through its entire depth and at multiple locations. Four borings were made in pile A, five were made in pile B, and three were made in pile D. Five soil extractions and four water extractions were made from each boring. Lead concentrations in the soil extractions ranged from 342.1 mg/kg to 837.0 mg/kg for clay pile A, from 442.5 mg/kg to 1141.25 mg/kg for clay pile B, and from 38.77 mg/kg to 454.0 mg/kg for clay pile D. One water extraction (A-4 @ 0.117 mg/l lead) exceeded the detection level (0.01 mg/l).

Regulatory History and Waste Characteristics

Delta was issued Administrative Order Number 2032 91, dated 13 May 1991 and Administrative Order Number 2044 91, dated 7 June 1991. Delta Brick has been issued National Pollutant Discharge Elimination System (NPDES) Permit Number MS0046728, which expired July 8, 1996, but is in the process of being renewed. The principal hazardous material produced at the facility is lead contaminated clay waste (Reference 4). For purposes of this report, the contaminant of concern is lead (see the previous paragraph and Reference 4). The waste quantity was conservatively calculated using the estimated volume of the clay piles.

Groundwater Pathway

Mississippi is located in the Gulf Coastal Plain of North America. The state is divided into twelve physiographic provinces of which four are represented in Noxubee County. The four provinces represented in Noxubee County are: 1) the North Central Hills province, which makes up about

1/16th of the county in the southwest corner of the county; 2) the Flatwoods province, which comprises about one-quarter of the county in a diagonal band running from the northwest to the southeast in the southwestern part of the county; 3) the Pontotoc Ridge, which comprises about 3/16th of the county in a diagonal band running from the northwest to the southeast corners of the county; and 4) the Black Prairie province, which comprises the northeast one-half of the county. The Delta Brick facility lies within the Black Prairie province.

The facility is underlain by approximately six feet of silty and loamy soils. Underlying the surficial soil unit is approximately 580 feet of chalk and marly chalk of the Demopolis Chalk Member of the Selma Group. Below the Demopolis Chalk, in descending order, are the Eutaw and McShan formations, the Gordo formation, and the Coker formation. The Eutaw and McShan formations, consisting of fine to medium glauconitic sand interbedded with shale and clay, are considered to be one aquifer system with a combined thickness of approximately 400 feet thick. The Gordo is approximately 380 feet thick and consists of irregularly bedded fine to coarse sand and clay. Beds of clay in the upper part of the Gordo Formation separate this formation from the overlying Eutaw-McShan aquifer. The Coker formation, approximately 600 feet thick, is composed of clay and irregular beds of sand in the upper part, and it is composed of clay, sand, and gravel in the lower part. This lower part of the Coker is where the Massive Sand aquifer is situated. The formations dip southwestward.

According to the water well printout from the U.S. Geological Survey, there are 46 private/domestic drinking wells and four municipal wells within a four-mile radius from the site. These wells serve a total estimated population of 3,782 people (based on the 1990 census). All of the private wells are screened in the Eutaw-McShan aquifer; whereas, all four of the municipal wells are screened in the Massive Sand of the Coker formation. The nearest private well is N002 located 0.625 mile southwest of the facility. It is screened in the Eutaw at a depth of 934 feet. The nearest municipal well (H038) is located 1.6 miles north-northeast of the facility and is screened in the Massive Sand at a depth of 1,777 feet. The number of wells within a four-mile radius from the site are listed below as to distance and aquifer:

Distance (miles)	Number of Private Wells in Aquifer		Number of Public Wells in Aquifer	TOTAL
	EUTW	MCSN	MSSV (COKER)	
0 - ¼				0
¼ - ½				0
½ - 1	1			1
1 - 2	9		3	12
2 - 3	19	1	1	21
3 - 4	15	1		16
TOTAL	44	2	4	50
Total Private				46
Total Public				4

EUTW - Eutaw MCSN - McShan MSSV (COKER) - Massive Sand

(References 3, 4, 5, 7, 9, 12, 18, 19, and 20)

Climate and Soils

Annual precipitation for the Macon, Noxubee County area is 52 inches (Reference 8). Mean annual lake evaporation is about 42 inches; thus, the resultant net precipitation is 10.0 inches (Reference 15). The two-year, 24-hour rainfall is around 4.3 inches (Reference 10).

Based on the soil survey map of Noxubee County, the predominant soil at the facility is the Urbo-Mantachie association, occasionally flooded. These soils, located on flood plains and stream terraces, consists of two soils: 1) a nearly level, somewhat poorly drained, silty and loamy soil, and 2) a nearly level, moderately well drained, loamy soil. The near surface water table is less than two feet below ground surface in winter and early spring (Reference 12).

Surface Water Pathway

Surface water flows west approximately 150 feet to an unnamed slough, the nearest perennial stream (References 3). Flow then travels southeast in the slough for 0.762 mile before entering the first of two small lakes. Flow continues southeastward in this first lake for 0.438 mile, and then it enters a cut about 50 feet long which opens into the second lake. The flow remains in the second lake for 0.36 mile before entering a cut, approximately 200 feet in length, which empties into the Noxubee River. The flow proceeds southward and then eastward in the Noxubee River for approximately 13.4 miles to complete the 15-mile pathway. Approximately 0.762 mile of wetlands are present in the 15-mile surface water pathway. These wetlands are located along the slough at the beginning of the surface water pathway.

The facility is listed as located in a **special flood hazard area** (Reference 11). For purposes of this report, the special flood hazard area was equated with the 100-year flood zone. There are no drinking water intakes located along the 15-mile surface water pathway (Reference 17). There are no Federal or state designated endangered or threatened aquatic species known to inhabit the Noxubee River or its tributaries along the 15-mile pathway (References 13 and 14).

Soil Pathway

The facility is situated in the floodplain of the Noxubee River about 1.0 mile south-southwest of Macon on Highway 14. According to the 1990 census, Macon has a population of 2,256. The majority of the area surrounding the site is industrial and open field. There are approximately 100 employees.

The table below shows the estimated residential population within one mile of the facility:

DISTANCE (mile)	NUMBER OF RESIDENTS*
0 - ¼	0
¼ - ½	0
½ - 1	30**
TOTAL	30

* 3.04 persons per household for Noxubee County.

** Approximately 10 houses × 3.04.

The nearest resident is approximately 0.73 mile southeast of the facility on the west side of Highway 45. A fence restricts access to the site. There is no school or day care center within 200 feet of the facility (Reference 3,4). There are no endangered or threatened terrestrial species listed specifically for Noxubee County, although five species are listed as endangered for the entire state. The species listed for the entire state are the Florida panther, the bald eagle, the peregrine falcon, Bachman's warbler, and the red-cockaded woodpecker (References 13 and 14).

Conclusion

The MS OPC concludes that no further remedial action is recommended under the CERCLA program.

REFERENCES

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3. Topographic Maps of the Delta Brick, area, Columbus, Mississippi.

Brooksville, MS Quadrangle	- 7.5 Minute Series
Lynn Creek, MS Quadrangle	- 7.5 Minute Series
Macon, MS Quadrangle	- 7.5 Minute Series
Mushulaville, MS Quadrangle	- 7.5 Minute Series
4. Information from the MS OPC Hazardous Waste Division files on Delta Brick, Macon, Noxubee County, Mississippi.
5. Printout from U. S. Geological Survey Data Base of Wells within the Delta Brick, Macon, Mississippi study area.
6. Information on Public Water Supply Wells in Noxubee County, Mississippi, from the Water Supply Division, Mississippi State Department of Health, Division of Water Supply.
7. Average Population per Household, Noxubee County, Mississippi, April 1990 Census.
8. Mean Annual Precipitation Map, 1951-1980, Tishomingo County Geology and Mineral Resources, by Robert K. Merrill, Mississippi Bureau of Geology, p. 13.
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12. United States Department of Agriculture, Soil Survey of Noxubee County, Mississippi, October 1986, pp. 5, 6, 53, 55, Sheet Number 32, the General Soil Map, and the Soil Legend.
13. U. S. Fish and Wildlife Service:
 - 1) Vicksburg Office, Species List by County.
 - 2) Jackson Office, Topographic Maps Indicating Sensitive Environments.
 - 3) Region IV - Atlanta, "Endangered and Threatened Species."

14. "Endangered Species of Mississippi, 1992," Mississippi Department of Wildlife, Fisheries and Parks, Museum of Natural Science.
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16. Information on groundwater and surface water use from the Mississippi Office of Land and Water Resources, Jackson, Mississippi.
17. The Upper Cretaceous Deposits, Bulletin 40; 1940, by Lloyd William Stephenson and Watson Hiner Monroe, Mississippi State Geological Survey, Plate 2.
18. Water for Industrial Development in Kemper, Leake, Neshoba, Noxubee, and Winston Counties, Mississippi, 1972: by R. E. Taylor, and F. H. Thomson, U. S. Geological Survey and the Mississippi Research Development Center, pp. 5, 6, 8, 28, 32, 36, and 37.
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Federal Register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300

Hazard Ranking System; Final Rule

SUPERFUND CHEMICAL DATA MATRIX

9 March 1993

REFERENCE 2

OVERSIZED

DOCUMENT

**SITE INVESTIGATION
WORKPLAN**

Prepared For
DELTA BRICK
Macon, Mississippi

By
Clearwater Consultants, Inc.
Starkville, Mississippi

June 1991

Reference 4

1. Introduction

Delta Brick owns and operates a kiln dried brick manufacturing plant located near Macon, Mississippi. The location of the plant is shown in Figure 1 and a site plan is presented in Figure 2. In October, 1990 the Office of Pollution Control obtained four soil samples from drainage features on the property which indicated the presence of relatively low levels of lead. It was determined that additives containing lead had been used to impart color to certain styles of bricks which represented a small fraction of the total production at the plant. Use of such additives was discontinued in 1989; however, waste clay piles present at the site are believed to contain unknown concentrations of lead bearing material.

Subsequently the Office of Pollution Control issued to Delta Brick Administrative Order No. 2032 91 (Order), a copy of which is presented in the Appendix. This Order requires that Delta Brick formulate a workplan sufficient to determine the extent of surface and subsurface contamination of lead, chromium and barium. The workplan is also to provide for all analyses required to determine if any soils found to be contaminated with such material are hazardous, as defined by the Mississippi Hazardous Waste Management Regulations.

This workplan was developed to fulfil in part the requirements of the Order. The following sections will describe a plan for sampling, testing and project management designed to document existing site conditions with respect to the pollutants specified

and other relevant site characteristics, and provide a basis for any subsequent evaluations or remedial action required.

It is the intention of the workplan that all sampling activities be in compliance with the provisions of EPA-600/4/83-040, "Characterization of Hazardous Waste Sites - A Methods Manual, Volume II", or other methods approved in advance by the OPC. Likewise, all analytical procedures shall be in accordance with SW-846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods".

ENGINEERING REPORT
NPDES COMPLIANCE WORKPLAN

Prepared For

DELTA BRICK

Macon, Mississippi

By

Clearwater Consultants, Inc.

Starkville, Mississippi

November 1991

Reference 4

1. Introduction

Delta Brick owns and operates a kiln dried brick manufacturing plant near Macon, Mississippi. The location of the plant is shown in Figure 1 and a site plan is presented in Figure 2. As a result of a site inspection on October 10, 1990 two small unpermitted wastewater discharges were discovered. Further investigation revealed that the wastewater discharges consist of small quantities of wastewater generated from several sources including brick saw cooling water, slurry water, wastewater generated from the cement mortar coating process as well as some effluent from four on-site septic tank systems.

Subsequently, on April 10, 1991, Delta Brick submitted a NPDES permit application to the Office of Pollution Control for the two wastewater discharges. As a result of the permit application Delta Brick was issued a draft NPDES permit on June 1, 1991 to discharge its wastewater to an unnamed tributary thence to the Noxubee River. Due to the intermittent flows in the small, unnamed tributary which serves as the receiving stream, very stringent discharge limits were included in the draft permit. A copy of the proposed NPDES permit is enclosed in the appendix of this report.

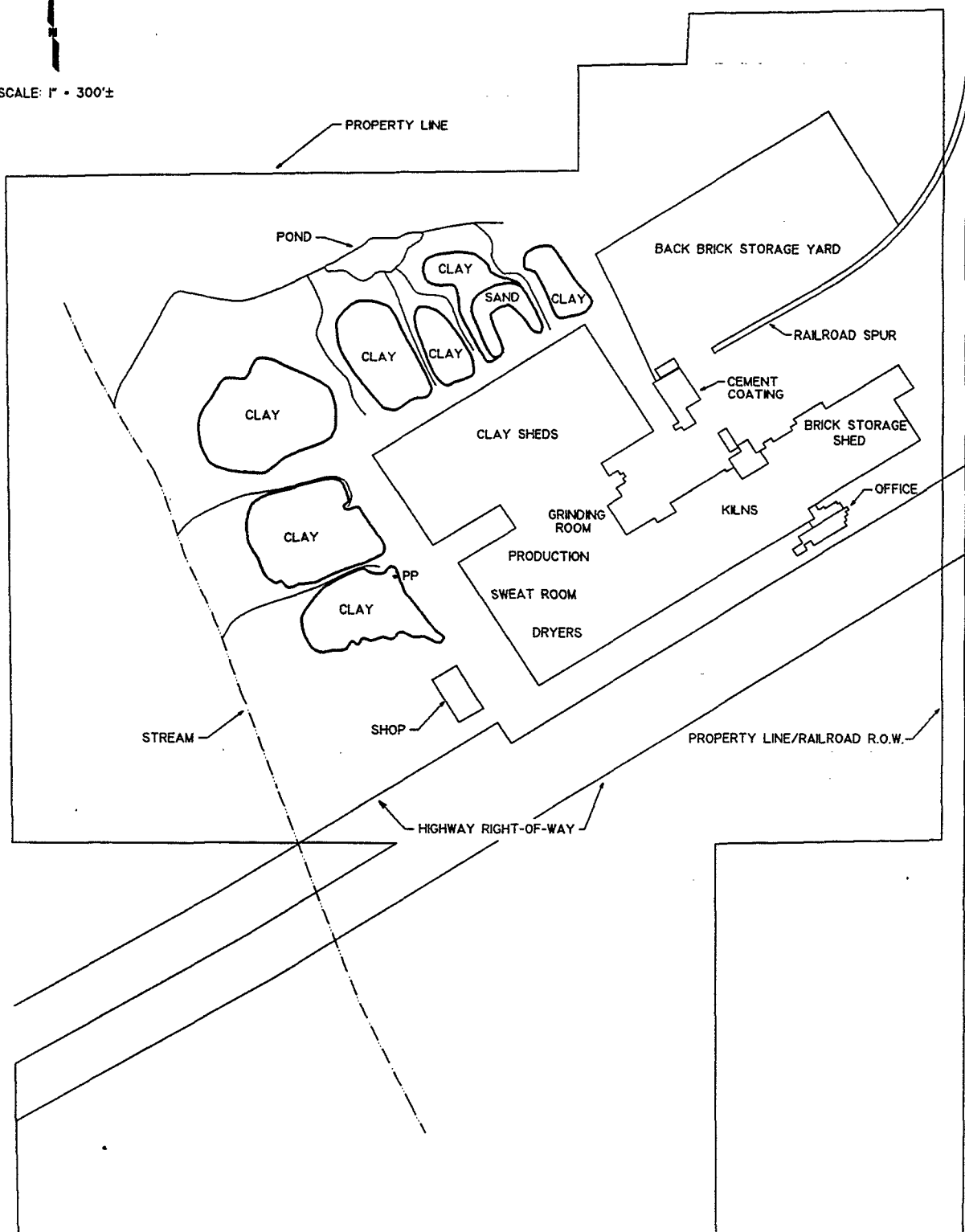
Once the draft NPDES permit was issued, Delta Brick entered into Administrative Order No. 2044 91 on June 7, 1991.

The first condition of this Order required Delta Brick to construct a detention pond and containment dike in order to contain all contaminated water on the plant property until it was diverted to the waters of the state. This requirement of the order was met by using an existing on-site detention pond and constructing the appropriate levees to control the wastewater flow prior to discharge.

The second condition of the order requires Delta Brick to submit an engineering report which addresses a plan for achieving compliance with the NPDES permit. This report has been developed to fulfill the requirements of this condition of the Administrative Order.

The first part of this report addresses current conditions at the plant site. Existing water use patterns are analyzed in order to estimate the quantity of wastewater generated by the processes and personnel at the plant. Existing wastewater treatment and collection facilities are described in detail so that the physical layout of these facilities can be considered. The wastewater generated at the plant is categorized into two distinct groups and the wastewater characteristics for each group are discussed based on analytical data from samples taken from the drainage ditches.

SCALE: 1" = 300'±



SITE PLAN

FIGURE
2

CLEARWATER CONSULTANTS, INC.
STARKVILLE, MISSISSIPPI

DELTA BRICK, INC.
MACON, MISSISSIPPI

ENGINEERING REPORT
NOVEMBER 1991

The second part of the report presents three possible collection and treatment alternatives which are considered to be viable methods for meeting the NPDES permit limits.

Finally, recommendations are provided which layout a logical, sequential process for collecting and evaluating the quantity and characteristics of the combined wastewater flows generated on the plant site. Completion of the recommendations will provide data needed to determine which of the three alternatives will produce the most environmentally sound, cost effective, and efficient means of meeting the NPDES permit limits.

2. Existing Water Use Patterns

Delta Brick is supplied with all process and potable water from the City of Macon Municipal Water System. Water meter readings for Delta Brick were obtained from the Municipal Water System Office for the previous twelve month period. Two water meters are in service at the plant. A smaller meter is used to serve the front office area while a larger meter serves the remainder of the plant. The average daily water use for the smaller meter over the past year has been 242 gallons per day. The average water use through the large meter has been 33,000 gallons per day.

Water is used in significant volumes in the brick manufacturing process. The vast majority of the water is mixed with the clay in order to provide sufficient moisture content to make the mixture extrudable in order to form the bricks. After a period of air-drying, the bricks are placed in large kilns for firing. Virtually all of the moisture added to the clay is lost to evaporation during this process. There are no wastewater discharges which are produced as a result of this process.

Aesthetic coatings are applied to the exterior surfaces of certain types of bricks. These coatings are applied in a slurry formed with potable water. The use of these coatings is intermittent depending on the type of bricks being manufactured. The total volume of water used in these coatings is only a minute portion of the total water usage at the plant. A small volume of wastewater is produced as a result of the coating process.

The final source of process wastewater is generated through contact cooling water used for brick sawing operations. This is a continuous operation (1 shift per day) in which the face of all types of bricks manufactured at the facility is removed for use on display boards. Cooling water is used on a continuous basis when the saws are operating but again makes up a very small portion of the total plant water use.

Due to the very small quantities and intermittent nature of the process wastewater flows, the use of any type of conventional flow monitoring equipment has not been feasible. In order to get accurate flow data on the process wastewater leaving the plant some type of central collection system must be installed. A process wastewater flow of 1000 gallons per day has been estimated through observations of the flow depths in the discharge piping. The 1000 gpd figure is believed to be a conservative estimate, however additional flow monitoring is needed to determine the process wastewater flowrates.

Delta Brick employs a total of 100 persons on the plant site. Water usage by personnel is limited to sanitary use in toilets, lavatories and sinks. The wastewater is collected and treated in septic tanks located on the plant property. The quantity of water used by personnel can be estimated using a typical per capita water usage rate of 10 to 20 gallons per capita per work day. This results in an estimated sanitary water use of 1000 to 2000 gallons per day. Drainage from septic tank lines has been estimated to be approximately 1000 gpd.

3. Existing Discharge Characteristics

3.1 Wastewater Sources and Discharge Locations

Wastewater is currently discharged through open drainage features which flow into the receiving stream. All open drainage features through which the wastewater flows are located on plant property. One of the open drainage ditches flows north from the back of the plant then turns west and passes through a settling pond before flowing into the receiving stream. The other open ditch is located just west of the plant where it takes a westerly course to the receiving stream. The location of the discharge points and the path of the open ditches are shown in Figure 3. Areas adjacent to the elevated portion of the site are periodically inundated by flooding from the adjacent Noxubee River. The general path of the tributary to the river is indicated in Figure 1.

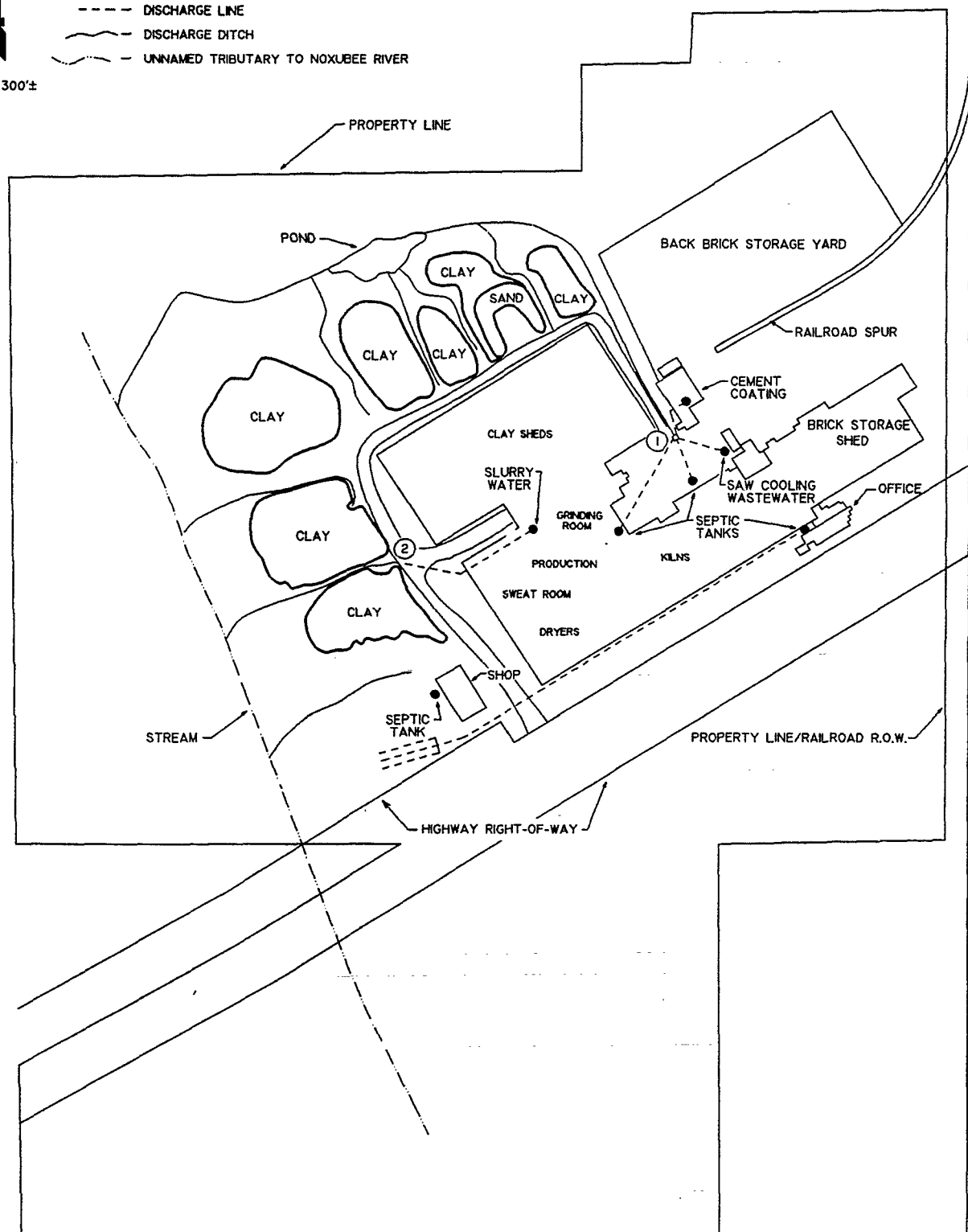
3.2 Probable Discrete Discharge Characteristics

The wastewater generated from the discrete sources shown on Figure 3 of this report can be categorized into two distinct groups which have similar wastewater characteristics. These groups consist of process wastewater and sanitary wastewater.

Samples of wastewater from each of the discrete wastewater sources were impossible to collect due to the extremely small flowrates, the intermittent nature of the discrete discharges, as well as the absence of accessible sampling points on any of the wastewater

② - INDICATES DISCHARGE POINTS
 ● - INDICATES SOURCE OF WASTEWATER
 --- DISCHARGE LINE
 --- DISCHARGE DITCH
 --- UNNAMED TRIBUTARY TO NOXUBEE RIVER

1" = 300'±



WASTEWATER SOURCES AND DISCHARGE POINTS

FIGURE 3

discharge lines. However, a number of samples have been collected from discharge points 1 and 2 on the north and west sides of the plant respectively. Based on laboratory data from tests conducted on these samples it is believed that a reasonable estimate of the wastewater characteristics can be made for discrete process and sanitary wastewater sources. However, once a central wastewater collection system has been installed, testing of each of the two combined wastewater discharges must be conducted in order to determine the wastewater characteristics for each of the two groups of wastewater. Such data must be available for use in conceptual design and evaluation of final treatment alternatives.

3.2.1 Sanitary/Noncontact Cooling Wastewater

Delta Brick employs approximately 100 employees at the Macon Plant. The plants kilns operate on a twenty four hour basis; however, the manufacturing, maintenance and shipping departments operate on an 8 hour daily shift. Since essentially all the employees work in the manufacturing, maintenance and shipping departments, sanitary wastewater is generated over a typical 8 hour work day.

Municipal sewer service is not available at the plant which has resulted in the installation of septic tank systems to treat sanitary wastewater. Several plant expansions over the years have resulted in the installation of a total of four septic tank systems rather than a single central system.

The office area of the plant is served by a septic tank which is located in front of the plant as shown in Figure 3. This system receives all of the sanitary wastes from the office area as well as a small portion of noncontact cooling water and some stormwater. A small pump is installed in the septic tank which is used to transport the effluent through a forcemain to a drain field as shown in Figure 3.

The manufacturing and shipping departments are the largest contributors of sanitary wastewater. The two septic tank systems which collect and treat the wastewater from these departments are located in the central portion of the plant as shown in Figure 3

The remaining septic tank system is located adjacent to the maintenance building which it serves. This is a very small system due to fact that only five to six employees occupy this building.

All the septic tank systems were installed with drain fields in order to allow the septic tank effluent to seep into the ground for final disposal. Based on observations of the septic tanks located in the central portion of the plant and test results of the water samples obtained at discharge point 1 (Figure 3), it is believed

that the drain field lines are plugged or that the soil surrounding the drain fields is of an impermeable nature. Therefore, the drain field is simply acting as a conduit to transport the effluent to the surface drainage features of the area. It is recommended that all sanitary wastewater be collected at the effluent pipe of each of the septic tanks and transported to a central sanitary wastewater manhole for additional treatment and/or discharge.

A reasonable estimate of the wastewater characteristics of the septic tank effluent can be made from tests performed on water samples collected from the north discharge ditch at discharge point number 1 as shown in Figure 3. The sample was collected during a time when no process wastewater was being discharged and the test results are typical of septic tank effluent. The results are presented in the appendix of this report. Analysis of the results of these tests indicate that septic tank effluent would require treatment to reduce the BOD₅, total suspended solids, and ammonia nitrogen concentrations in order to comply with the NPDES permit limits. Disinfection of treated effluent would also be required.

3.2.2 Process Wastewater

As discussed previously the vast majority of water used in the brick manufacturing process is lost through evaporation in the kilns. The only process wastewater generated in the plant is a result of slurry type coatings which are applied to the exterior of finished bricks and water which is used to cool brick saws.

Discharge point number 2 (Figure 3) just west of the plant is the point where the slurry wastewater is discharged. This wastewater is discharged intermittently depending on the type of bricks being manufactured. The slurry is an aesthetic coating which is applied to the exterior of certain types of bricks. The slurry is a mixture of certain types of clays, sands and colorants. Various colorants may be used in the process depending on the type of brick being manufactured. The colorants may consist of red ore, chromate or manganese. A wastewater sample collected from the receiving ditch at the slurry pipe discharge point is believed to give a fair representation of the slurry wastewater characteristics. The results of these tests are included in the appendix of this report. Analysis of this data indicates a wastewater which has high suspended and dissolved solids concentrations. In addition, the wastewater has color characteristics which will not meet the NPDES permit limits. All other tests results indicate the wastewater to be within the required permit limits.

The cement mortar coating is another aesthetic coating which is applied to the exterior of certain types of bricks. The wastewater is generated on an intermittent basis four times a week for a period

of four to five hours a day and discharged at discharge point number 1 (Figure 3). The cement mortar coating contains cement, sand, mortar and the same type colorants as described above for the slurry water. The combining of the cement mortar wastewater flows with the septic tank effluent and the lack of an accessible sampling point has made it impossible to collect a sample which is thought to be representative of the cement mortar coating wastewater. However, it is believed that this wastewater will violate the same NPDES permit limits as the slurry wastewater. The cement mortar coating wastewater should contain more grit and sand and less dissolved solids than the slurry wastewater. Turbidity and color will also cause permit violations with this wastewater.

Water used to cool the brick saws is also discharged as a process wastewater at discharge point number 1 (Figure 3). This wastewater is discharged on a continuous basis over an 8 hour operating day. The saw cooling wastewater contains brick dust from the sawing operations. The combining of the saw cooling water with the septic tank effluent and the lack of an accessible sampling point has made it impossible to collect a sample which is thought to be representative of the saw cooling wastewater. This wastewater will be similar to the slurry and cement mortar coating wastewaters described above. Although high suspended solids concentrations are expected these concentrations should be considerably less than the slurry and cement mortar coating wastewater. As with the other process wastewater color and turbidity will also cause permit violations. The wastewater should be able to meet the remaining NPDES discharge permit limits not specifically mentioned above without any additional treatment.

3.3 NPDES Permit Requirements

The proposed NPDES permit provides limits for discharge points 001 and 002 which are located north and west of the plant, respectively. The discharge limits are presented in Tables 1 and 2 on the following pages. A copy of the draft permit is enclosed in the appendix of this report.

A wide variation of wastewater characteristics is exhibited between the two groups of sanitary and process wastewater. In order to comply with the permit limits the sanitary wastewater must be treated to reduce the concentrations of BOD₅, ammonia nitrogen and total suspended solids. The sanitary wastewater will also have to be disinfected to meet the fecal coliform limits. The process wastewater will require treatment to achieve reductions in total suspended solids, turbidity and color. Based on test results from samples taken in the discharge ditches, no additional treatment should be required for the removal of lead, zinc, selenium, or chromium.

TABLE 1 NPDES DISCHARGE LIMITS - NORTH OUTFALL NO. 001

Parameter	Quarterly Average	Quarterly Maximum
BOD ₅	10 mg/l	15 mg/l
Total Suspended Solids	90 mg/l	135 mg/l
Ammonia Nitrogen	2 mg/l	4 mg/l
Fecal Coliform Bacteria		
Summer (May-October)	200 col/100ml	400 col/100ml
Winter (Nov.- April)	2000 col/100ml	4000 col/100ml
Lead, Total	1.3 ug/l	34 ug/l
Selenium, Total	5 ug/l	20 ug/l
Zinc, Total	59 ug/l	65 ug/l
Color	Not greater than background color	
Turbidity		<50 NTU
pH	6.0<pH<9.0	

TABLE 2 NPDES DISCHARGE LIMITS - WEST OUTFALL NO. 002

Parameter	Quarterly Average	Quarterly Maximum
BOD ₅	10 mg/l	15 mg/l
Total Suspended Solids	90 mg/l	135 mg/l
Fecal Coliform Bacteria		
Summer (May-October)	200 colonies	400 colonies
Winter (Nov.-April)	2000 colonies	4000 colonies
Lead, Total	1.3 ug/l	34 ug/l
pH	6.0<pH<9.0	

Note: Ammonia Nitrogen, Total Selenium and Total Zinc shall be monitored twice per quarter for a period of one (1) year. Based upon data collected the monitoring may be discontinued or discharge limits established.

Due to the variations in the characteristics of the two types of wastewater separate treatment schemes may be required to achieve compliance with the NPDES permit limits. Therefore, separate collection and transportation systems will be provided as part of the conceptual design of all alternatives, which include on-site treatment.

4. Wastewater Management Alternatives

4.1 General

Three wastewater management alternatives have been identified and subjected to preliminary evaluation for implementation at the Delta Brick facility. These alternatives are:

- ♦ Collection and Discharge to the Macon POTW
- ♦ Collection, Treatment and Discharge to a Receiving Stream
- ♦ Collection, Treatment and Recycle/Reuse

Each of these alternatives will be described in this section.

4.2 Collection and Discharge to the Macon POTW

One element common to each of the management alternatives is the need for a wastewater collection facility to prevent contamination of flows in open ditches prior to treatment. For the alternative of discharge to the Macon POTW, a collection facility designed to combine all wastewaters generated on site into a common flow stream would be required. Wastewater would then be pumped through a small forcemain to the Macon POTW.

As indicated in Figure 1, the Macon facultative lagoon is located north of the Delta Brick Plant and on the east side of the ICG Railroad. The Noxubee River lies between the plant and the municipal lagoon and presents a formidable obstacle to construction of a forcemain. The only viable route for the required forcemain would be along the ICG Railroad right-of-way. Using this route, the length of the proposed forcemain would be approximately 6,300 feet.

Inspection of the ICG track from the plant to the lagoon revealed that the line is elevated on a steeply sloping road bed with little available space in which to locate the forcemain. Two trestles are located along the proposed route. It is possible that an agreement could be reached which would allow attaching the forcemain to the underside of the railroad trestles. Across the trestles the forcemain would have to be insulated to protect it from freezing.

Given the length of the forcemain, the right-of-way to be acquired, the potential problems with freezing temperatures and settlement of fine solids during periods of inactivity, the alternative of discharge to the Macon POTW should only be considered after all other alternatives are determined not to be viable.

4.3 Collection, Treatment and Discharge to a Receiving Stream

The management option of collection, treatment and discharge to a receiving stream presents a unique challenge in that very small volumes of wastewater with greatly differing characteristics must be treated to comply with permit requirements. As indicated in the earlier section regarding wastewater characteristics, certain waste streams must be treated to reduce color, turbidity and suspended solids. Effluent from the plant septic tank system must be treated to remove residual BOD₅, suspended solids, ammonia nitrogen, and thereafter disinfected.

The possibility exists that it may be most effective and economical to treat the process and sanitary waste streams separately. Given the line sizes and distances involved, it will not represent an undue expense to provide for separate collection of process and sanitary flows. This strategy will allow either separate or combined treatment of the two major waste streams. A tentative layout for this type collection system is shown in Figure 4.

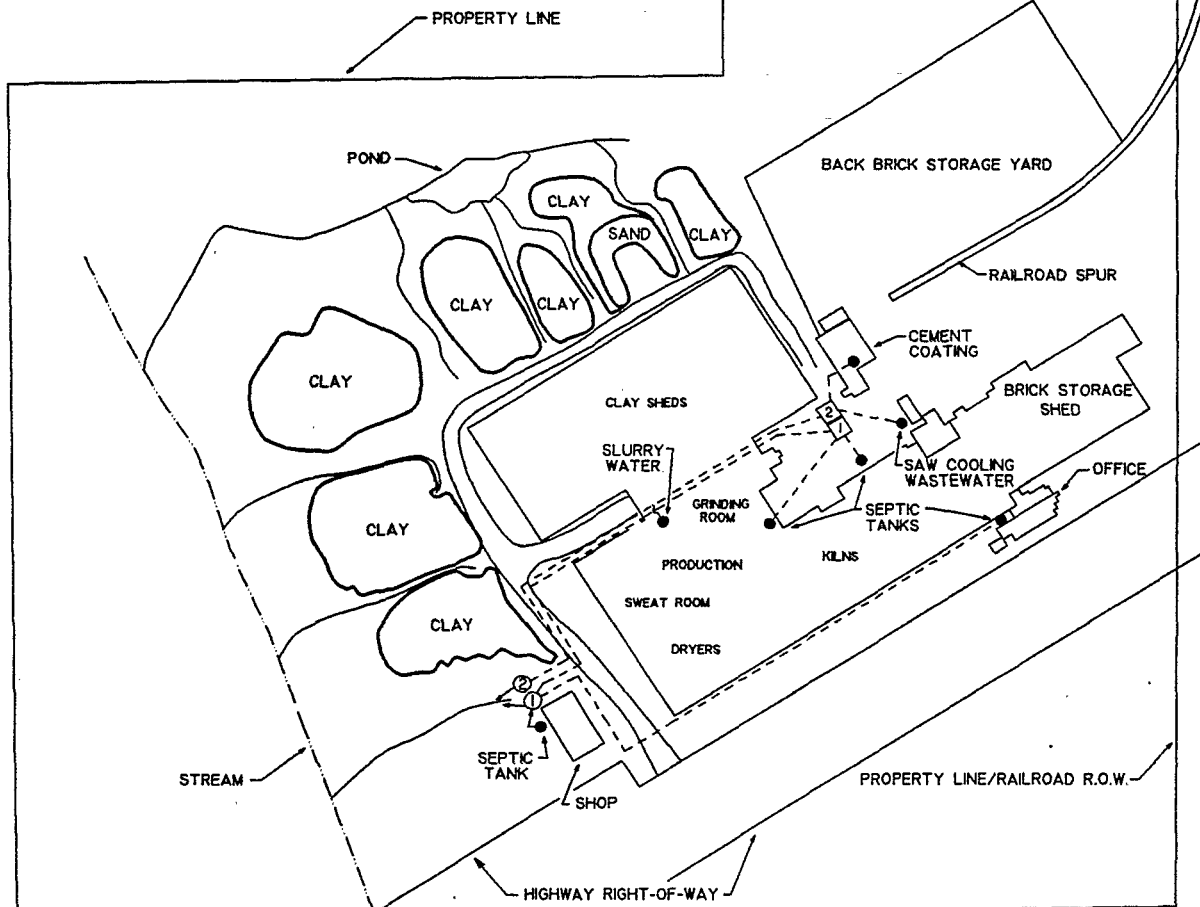
Once the process waste streams are combined, characterization and a limited treatability study are proposed to identify the most effective form of physical or physical/chemical treatment. It is proposed that effluent from such a treatment system be combined with effluent from the existing septic tanks for disinfection and final treatment.

Final treatment alternatives would include intermittent sand filters, an artificial wetland filter or a small package extended air activated sludge facility.

4.4 Collection, Treatment and Recycle/Reuse

The wastewater management strategy of collection, treatment and recycle/reuse proposed would be identical to that described in the previous section with the exception of final disposal of treated effluent. As indicated in section 2, considerable quantities of water are required to elevate the moisture content of the clay used in the manufacturing process. In this alternative, treated effluent would be recycled for use in manufacturing and plant cleanup.

SCALE: 1" = 300'±



- ① — SANITARY/COOLING WASTEWATER COLLECTION MANHOLE
- ② — PROCESS WASTEWATER COLLECTION MANHOLE
- 11 — SANITARY/COOLING WASTEWATER COLLECTION SLUMP
- 22 — PROCESS WASTEWATER COLLECTION SLUMP

CENTRALIZED COLLECTION
SYSTEM FOR PROCESS AND
SANITARY/COOLING WASTEWATER

FIGURE
4

CLEARWATER CONSULTANTS, INC.
STARKVILLE, MISSISSIPPI

DELTA BRICK, INC.
MACON, MISSISSIPPI

ENGINEERING REPORT
NOVEMBER 1991

5. Recommendations

This report has been written to evaluate all available information in order to recommend action which should be taken to bring the wastewater discharges from the Delta Brick plant into compliance with the NPDES permit limits. The following recommendations are believed to provide logical, sequential steps which will produce the most efficient, environmentally sound and cost effective means for achieving NPDES compliance.

1. Design and construct separate wastewater collection facilities for process and sanitary wastewater similar to the facilities shown in Figure 4.
2. Conduct flow monitoring and sampling to quantify and characterize each waste stream.
3. Perform treatability study for process wastewater, if required.
4. Evaluate available treatment alternatives and select the most environmentally sound, reliable and cost effective alternative for implementation.
5. Design, construct and place the selected alternative in service.

A RISK ANALYSIS

Prepared For
DELTA BRICK
Macon, Mississippi

by
Clearwater Consultants, Inc.
Starkville, Mississippi

August 1995

Reference 4

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SOIL LEACHABILITY TESTS

For

Delta Brick

1.1 INTRODUCTION

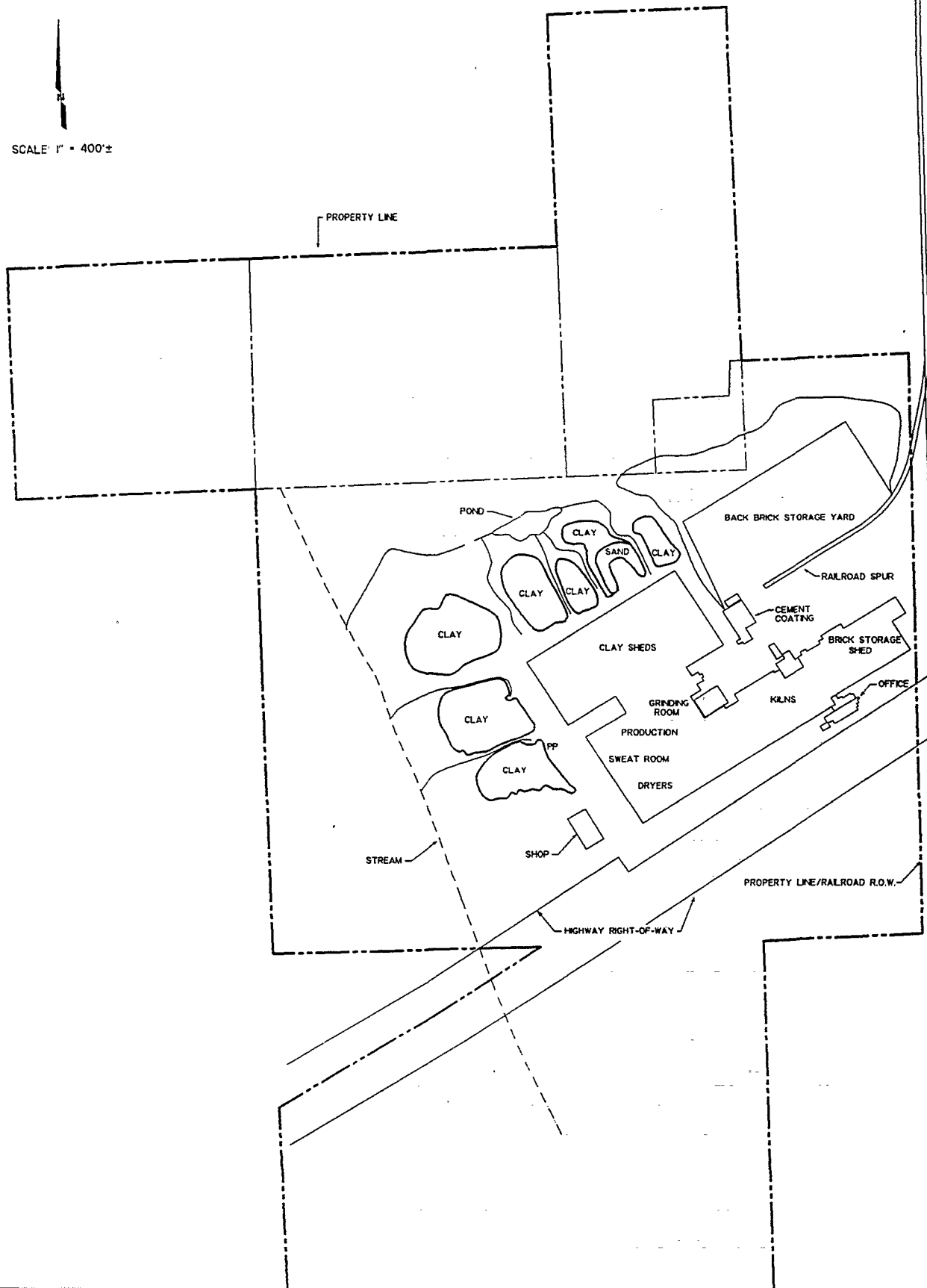
Delta Brick has seven piles of clay located on its property in Macon, Mississippi that contain low levels of lead. There have been concerns relative to the leachability of heavy metals from the site and Clearwater Consultants, Inc. was engaged to study this problem. The clay piles in question have been on the site for many years and resulted from clay materials used in the manufacture of bricks. A site plan showing the location of these clay piles is shown in **Figure 1**.

Because there may be some potential for undesirable materials to move off site, it seemed prudent to study material transport characteristics to determine apparent risks in this regard. It is not the task of this project to carry out detailed modeling of the site in question but rather to assess the potential for certain components contained in the clay material to move off site and contaminate other property.

Material transport that results from stochastic weathering events must follow fundamental physical laws. One such law is often stated in the every day vernacular. "Water always runs down hill". This statement is typically used as trivia but in fact states a universal principle. When materials move, there is always a force involved. In addition, there is always a force or resistance to oppose that force. In the case of water running down hill, gravity provides the force and friction and form drag provide the resistance. Even though the resistance may not be as apparent as the gravity, we know it is there, else the water would continue to accelerate to an infinite velocity. Actually, the water accelerates until the resistance is equivalent to the gravity force and the system is in equilibrium.

In exactly the same way, materials move in the environment as a result of a force or forces, albeit they may not all be as apparent as the example for water. A reverse statement for the water example would be that

SCALE: 1" = 400'±



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PLANT PROPERTY MAP
MARCH 1992

FIGURE
1

water cannot run uphill without external energy being applied, i.e. a pump. Similarly, chemicals do not concentrate in the universe but rather they become more dilute. If we pour out a bucket of salt water in our yard, we do not expect it to concentrate in the environment. Even though this concept is less familiar to most than the example of gravity and the movement of water, it is a well known thermodynamic law called entropy. This concept specifies that entropy of the universe is always increasing or the universe is becoming more dispersed, less organized. The bucket of salt water that was discharged in the yard will, in fact, become more dilute and less organized with time. When the rain falls on the salt water, the concept of entropy says the salt water will become more dilute rather than becoming more concentrated which would be exactly like water running up hill. Just as external energy is required to make water run up gradient, external energy must be applied to make the salt water concentrate rather than becoming more dilute. Many people are now familiar with special filters that are used to purify drinking water, especially when the source of the water is sea water. This process became headline news during Desert Storm when there was fear that Saudi Arabia's reverse osmosis plant would be a military target.

The natural force that makes the salt water want to become more dilute is known as osmotic pressure and is an easily measured quantity. In the case of water flow, the steeper the slope the greater the component of gravity that forces the water to move. In parallel, as the concentration of salt water increases, the greater is the osmotic pressure, and greater is the tendency for the salt to disperse. Since the salt water in our example is more concentrated than rainwater, there is a strong spontaneous drive toward a more dilute system. It is a matter of common sense or experience that we would expect things to become more dilute. If we add fresh water to salt water, we don't expect the resulting system to become more concentrated or to see salt precipitate from solution.

This tendency toward dilution involves action on a molecular level. As the rain increases, the salt water becomes more dilute and eventually will flow in the runoff from the yard and will, in time, be taken long distances, i.e. to the ocean. The dilution process will continue until the salt becomes background level in an inland stream or it enters the ocean where it serves to dilute the more concentrated sea water. If our bucket of salt water were

large enough and the concentration were high enough, some salt would be detectable in the yard in the vicinity of where the bucket was discharged. As the distance down gradient became greater and greater, the residual concentrations would become less and less and never would be higher than the original concentration in the bucket. The transport of salt in the environment takes place easily because of several features. Salt is naturally highly soluble in water and for the example here, the salt is already in solution.

Salt in the solid form represents a new point of beginning. It needs only to become more dilute and flow with the runoff. If now we place a solid block of salt in the environment, a much longer period of time would be required to solubilize the salt and for it to be transported in the environment. Cattle farmers typically place salt blocks in pastures for cattle consumption and expect these blocks to remain over extended periods of time without losing a substantial amount of salt. If a shelter is provided and the salt is kept completely dry it would remain in tact for a very long period of time. If the salt used in these blocks were different from sodium chloride and a relatively insoluble salt were selected, the life of the block would be greatly enhanced. If the salt selected were essentially insoluble, placed under a shelter, below ground level to keep it from the cows and the environment, the salt block would likely survive many generations and remain in essentially the same configuration as when placed in the ground. This is indeed the approach taken to prevent material transport from Subtitle D landfills. Rather than a roof as one normally thinks of, a cap of low permeability material is used to prevent water from entering the fill and solubilizing materials placed there for safe storage. If the material is hazardous, it may be solidified with cement or flyash for further protection. It can be readily visualized that our salt block placed in a sand bed would be readily susceptible to leaching whereas, if the same salt block is encased in cement or other impermeable material, the potential for leaching would be minimal.

The foregoing discussion demonstrates in a simplistic way some important variables involved in material transport. If we remove the driving force from the flow of water, it will cease to flow. In the same way, if we remove the driving force(s) for material transport, it will cease. In the case of the lead contained in the clay on Delta Brick's property, it will be shown

that this material closely parallels the example of an insoluble salt block encased in cement, flyash, or other insoluble material. It will also be shown that the Delta Brick system does not follow any systematic system from a high concentration to a low concentration that would be required for a spontaneous natural event. To that end, the discussion will become slightly more technical so that the parameters involved in material transport can be quantified.

As was the case for each example cited above, environmental transport takes place according to specific laws that govern the behavior of the materials involved. Transport processes are subjected to stochastic natural processes that may vary considerably over a millennia or even a few hundred years. Because of the fact that natural processes such as rainfall, evaporation, and temperature cannot be predicted with certainty, it is difficult to predict a precise outcome for exact transport for a specified time period. However, much very useful information can be determined and specified that will help in assessing the risk involved. In some cases one can say what is not possible without knowing the exact answer. For example, if we know the capability of a specific airplane flying from Memphis to Atlanta and the distance involved, one can specify the minimum time required and an expected time of arrival even though the actual time cannot be specified.

In a previous section an old cliché was noted, "water runs down hill". Even though we may not be able to know with precision how fast it will travel or other details taking place from one point to the other, it is known that the fluid will always be acted on by gravity and will follow the gradient.

2.1 HYDRAULIC CONDUCTIVITY/FLOW

One very important feature of material transport in the environment is the ability/inability of water to flow through a soil matrix that contains the material to be transported. The higher the permeability of the soil, the higher the flow for any given circumstance, and the greater the potential for leaching contaminants. In a technical way, the parameters required to describe the flow rate of liquids are Driving Force and Resistance. For work involving flow through porous media, a Flow Coefficient(K) and a

Resistance(H/L) are used. The equation describing the volumetric rate of flow is given as follows:

$$Q/A = K(H/L)$$

where: Q = Volumetric Flow Rate

A = Cross Sectional Area

Q/A = Velocity

H = Head

L = Length

K = Hydraulic Conductivity

In situations where the soil matrix is completely saturated, H/L is equal to unity. Even though this is not always the case for Delta Brick, this assumption represents a worse case scenario for this specific site and will be used for discussion. When the soil is not saturated, H/L become indeterminate, and flow does not occur. In simplistic terms, when the soil is saturated (typically during the winter months) there is a potential for flow and when the soil becomes dry (typically during the summer) flow ceases and does not flow again until the soil is again saturated. Therefore, the assumption of saturation will make the analysis somewhat conservative. It would be difficult to estimate the period of saturation or non saturation during any given year and may be of little consequence for this analysis. Because of the noted assumption, the above equation may be simply stated as follows.

$$Q/A = K$$

If the appropriate flow area is selected to be 1 cm^2 , the volumetric flow becomes the equivalent of the hydraulic conductivity and the equation may be reduced further as shown below.

$$Q = K$$

where: Q = volumetric flow

K = hydraulic conductivity

As may be noted by this equation, one can calculate volumetric flow simply by specifying the hydraulic conductivity and this will be done in a

subsequent section. Hydraulic conductivity is a standard test that may be applied to describe any specific soil. It was therefore desirable to measure the hydraulic conductivity of the actual soil that makes up the clay piles in question. The maps presented in **Appendix A** show the locations from which samples were collected. Appropriate samples were collected under the supervision of Clearwater Consultants, Inc. The chain of custody and the handling of these samples are described in their report and will not be addressed further here. Samples collected by the Engineer were submitted to a soils laboratory for the permeability analysis and the results of this testing are given in **Appendix A**.

3.1 LEACHING TESTS

The leachability of components from a soil matrix are highly site specific and require measurements that are site specific and component specific. As described in the previous section, multiple samples were collected from three locations, therefore the data collected is specific for the locations sampled. In addition to hydraulic conductivity, solubility is an important parameter in estimating leaching potential. In order for leaching to take place, the compound of interest must be soluble in water and there must be a net flow through the matrix. Both parameters can be combined in leaching tests.

There are two major leach test procedures commonly in use to experimentally measure the quantity of materials that can be leached from a soil matrix. Both tests are somewhat artificial in that they are measured in the laboratory as opposed to in-situ. However, both tests are used extensively by the U.S. Army Corps of Engineers, Waterways Experiment Station as well as others interested in leaching phenomena. Many variations of these tests have been proposed and/or utilized and the scenario of choice depends upon the problem at hand. The two most common methods used include column leach testing and batch leach testing.

Absorption processes such as carbon absorption are familiar to most scientists who study material transport. Desorption is an analog process that describes the leaching tendencies of specific components from specific absorbates. It is clear that the sorption/desorption process is not completely reversible. This fact is abundantly clear each time one makes an attempt to

completely remove stains from clothing. A handyman will find it impossible to completely restore a white tee shirt soiled as a result of maintenance operations on the family lawnmower. Indeed desorption isotherms show that the process is not completely reversible. In the case of stain removal, it is interesting to note that many times, special "stain removers" are used to desorb additional material, albeit many times the stain is not removed but masked or decolorized. However, the conditions under which the release takes place are most important. The U.S. Environmental Protection Agency recognized this fact in the development of the EP Toxicity test and the TCLP test. Both of these tests utilize batch extraction procedures that are based on a weak acid (acetic acid) extractant. It is not meant to measure the total quantities of the metals present but is rather a crude simulation of landfill conditions which provided the basis of a regulatory procedure. Very different results would be obtained if the extractant were rainwater or a solution of HCl and HNO₃. Rainwater would most adequately describe the natural process occurring at Delta Brick while the mineral acid extraction would closely determine the total quantity of materials contained in the soil. Because it is desirable to determine the potential for leaching under natural conditions, pure water was used as the extractant because rainwater is essentially distilled water.

3.1.1 *Column Testing*

Column techniques have been used in a variety of ways to simulate field leaching processes. The migration of chemical substances through soil is often studied in this way. For example, it may be desired to study the interaction of leachate with underlying soils. A column is packed with a representative soil and then challenged with a specific leachate. Samples are collected and analyzed at periodic intervals to determine leachate quality after its passage through the soil column. Data collected from this apparatus are usually presented as a plot of leachate quality versus the volume of liquid passing through the column. Sometimes the cumulative volume is represented by the number of pore volumes that have passed through the bed. The curves are usually interpreted as relevant simulations of leachate quality under field conditions. The similarity between the laboratory column and field conditions can be

readily seen. However the test remains somewhat artificial since the soil used was manipulated prior to the testing.

Even though column studies provide useful data there are definite limitations. One major limitation of column studies is the length of time required to obtain the desired data. This is particularly true for clay soils that have *very* low hydraulic conductivities. To gain sufficient information to make predictions of leaching rates, the time frame may be months or years if a gravity column is used. Column flows are so small that the amount of sample needed for chemical analysis is difficult to obtain. Static pressure can be applied to increase the flow rate but even then, the flow velocity is very small and the test procedure becomes more artificial.

Operationally, column tests, particularly gravity columns, have limitations that can seriously compromise the utility of the data. For small diameter columns, side wall effects can be important. Since fluid flow in the field situation is gravity flow, gravity columns are usually used. Gravity columns are difficult to saturate and, as a consequence, channeling within the bed can lead to seriously misleading leaching rates. Pressurized columns yield higher flow rates, can be saturated, and can be operated anaerobically. However, the simulation of field conditions obtained may be questionable.

3.1.2 *Batch Testing*

The apparatus and testing procedures for batch testing are more varied than for column testing. Batch reactors have varied from mason jars to agitated tanks. Separatory funnels and Erlenmeyer flasks have also been used. Mixing has been provided by electric mixers, shakers of various configurations, and simple manual shaking. Solvents utilized as the extractant have included tap water, deionized water, and additives such as hydrochloric acid, carbon dioxide, acetic acid, glycol, glycerin, and caustic have been used for pH adjustment. Reaction periods vary from 30 minutes to 24 hours typically at ambient temperature.

Batch testing procedures evolved for almost a decade before standardization was attempted. The Japanese government appears to have been the first to adopt batch testing. The Japanese procedure employed continuous agitation for six hours at a pH between 5.8 and 6.3. The dilution ratio was 10:1 and temperature was ambient. Hydrochloric acid, carbon dioxide, and sodium hydroxide were used to adjust the pH to the proper range. Phase separation was by centrifugation and filtration.

The U. S. Corps of Engineers researched and developed a batch procedure known as the Elutriate Test. This test was designed specifically for evaluating the release of contaminants from dredged materials during open water disposal. The Elutriate Test uses a liquid/solid ratio of 4:1, an agitation period of 30 minutes and 1 hour settling. The liquid phase is decanted and filtered through a 0.45 micron filter. The test has been modified and used to assess water quality impacts of ponded water discharged from Confined Dredge Facilities during active dredging.

Several states developed their own batch test procedures. The Minnesota Pollution Control Agency used a distilled water method at a dilution ratio of 40:1. The dilution ratio was later reduced to 4:1. Acetic acid was used to adjust the pH to 4.5. The reactor was a separatory funnel, and the batch was mixed at initiation and once at termination of the test. The Illinois EPA test used deionized water, a variable dilution ratio and hydrochloric acid and/or caustic to adjust the pH to 6.0. The dilution ratio was a constant 4:1, and agitation was provided by a reciprocating shaker. Other states that developed their own procedure include Indiana, New Jersey, Michigan, Pennsylvania, and Texas.

3.1.3 *Field Application*

There are a number of test conditions that will affect the outcome of the test. Some of these include pH, oxidation-reduction potential, liquid/solid ratio, and the type of extractant. In addition to a consideration of these parameters, extrapolation to the field condition requires a technical basis that may be either empirical or

deterministic. The basic philosophy behind the EP (extraction procedure) and other similar procedures is somewhere between the two classifications. It is a criteria-comparison type test developed out of regulatory necessity for a fast, uncomplicated, standardized procedure. EP leachate is compared to a set of specific concentration limits for selected contaminants. This provides the basis for classifying a waste as hazardous or nonhazardous.

The EP leach test, however, is not suitable for describing the source term in an environmental transport model. It does not provide information on leaching kinetics or on equilibrium desorption coefficients for the solid and aqueous phases. EP data should correlate to the field situation in some way, however correlation functions have not been established. The utility of the EP as a direct simulation of the field situation is also limited. In particular, the leachant pH, the oxidation-reduction potential, and the liquid/solid ratio used do not simulate field conditions in most situations. Hence, direct extrapolation to the field situation on the basis of similitude is usually not justified.

The elutriate test is similar to the EP in that it is a standardized procedure that is fast and uncomplicated. Unlike the EP, it was designed to simulate a specific disposal situation for a specific type of material - dredged material. Elutriate data are extrapolated to the field situation on the basis that the test simulates critical field parameters related to contaminant mobility during dredging operations. The solid/liquid ratio, mixing effort, oxidation-reduction potential, and extractant were all selected to be representative of typical dredging operations. Therefore, the elutriate test is a good simulation of the short-term impact that dredged material has on the water it is mixed with during dredging. As is the case with the EP, the elutriate test provides little information of the basic processes responsible for contaminant transfer from dredged material solids to the aqueous phase.

4.1 TEST PROCEDURES FOR DELTA BRICK

Accelerated testing is mandatory for environmental transport studies. If testing times approach those of the natural setting, there is little practical use for the results. This is especially true for tight clays that have hydraulic conductivities in the range of 10^{-9} cm/second. Therefore, leaching tests must be accelerated by modifying conditions of the test so as to enhance the leach rate. Several methods accelerate leaching by maximizing the driving forces. These methods include:

- testing at elevated temperature
- increasing the leachate velocity
- adjusting the pH, redox potential, and ionic strength

The major difficulty in accelerated testing is involved in the interpretation of the data obtained. This is especially true with the first and third items above. High temperatures may cause irreversible changes in the characteristics of the soil. Components (organics) with a relatively high vapor pressure may be desorbed and expelled from the system. Inorganics such as carbon dioxide, hydrogen sulfide, and others could be lost to the atmosphere. These factors would likely alter pH, redox potential, as well as ionic strength.

Intentional adjustments in pH, redox potential, and ionic strength are surely the most stringent and artificial. For example, an acidic pH in the range of 3.5 to 4.5 would likely improve the sorption of organic compounds that have carboxylic acid groups due to a shift in equilibrium to the non ionized species. At the same time, some metal ions would become more soluble and some less soluble. The ionic strength would also be increased, which in turn, would decrease activity coefficients. Oxidation-reduction potentials would be altered, as well as charge densities on contaminant adsorption sites on the clay particles. Additions of organic acids to adjust pH may react irreversibly with some metal ions. For example, acetic acid is a recognized chelating agent for metals such as chrome III. Strong mineral acids may react with organics or cleave chains through hydrolysis. If the purpose is to determine the total concentration of adsorbed metal ions, then a strong mineral acid is in order. If the objective is to predict leaching conditions in a natural environment, test conditions must be maintained that

do not significantly alter chemical and physical parameters. In order to circumvent these chemical problems, the testing used for Delta Brick will involve increasing the leachant velocity. Further, in order to provide a test that can be carried out in a reasonable time frame, a special rendition of batch testing will be utilized.

4.1.1 Batch Testing

Batch tests are rapid compared to column tests because, in a batch test, the renewal rate of leachant at the soil particle surface is virtually infinite compared to renewal rate in a column test. By relating the volume of liquid used in a batch test to the calculated percolation rate in the clay piles, sequential batch extractions will be the basis for the accelerated testing protocol for Delta Brick. A modification of the sequential batch testing approach is recommended here. Also, the assumption will be made that contaminant leaching is equilibrium controlled for the lead contaminant. This assumption is a very good one in this case and is justified on the basis that the rates at which desorption proceeds are fast in relation to the rate at which water percolates through tight clay materials. The procedure being recommended uses the same volume of leachant for successive extractions rather than increasing the water with each successive extraction (grading). This procedure will directly infer the long-term leaching response but will avoid changes in water to sediment ratios that can alter the outcome.

A clay sample is challenged with successive aliquots of distilled water. Phase separation is accomplished by centrifuging the sample at 6,000 to 10,000 rpm followed by filtration through a 0.45 micron glass fiber filter prior to chemical analysis of the leachant. The data can be used to plot a desorption isotherm if desired. The lead concentration in the soil following each extraction will also be determined. This latter analysis will provide for measured data rather than calculated data and substantiate the lead analysis in the original clay sample. The liquid volume then represents a calculatable number of years that would be required to pass that quantity of leachant (rain water) if the clay were completely saturated year around.

5.1 RESULTS/CONCLUSIONS

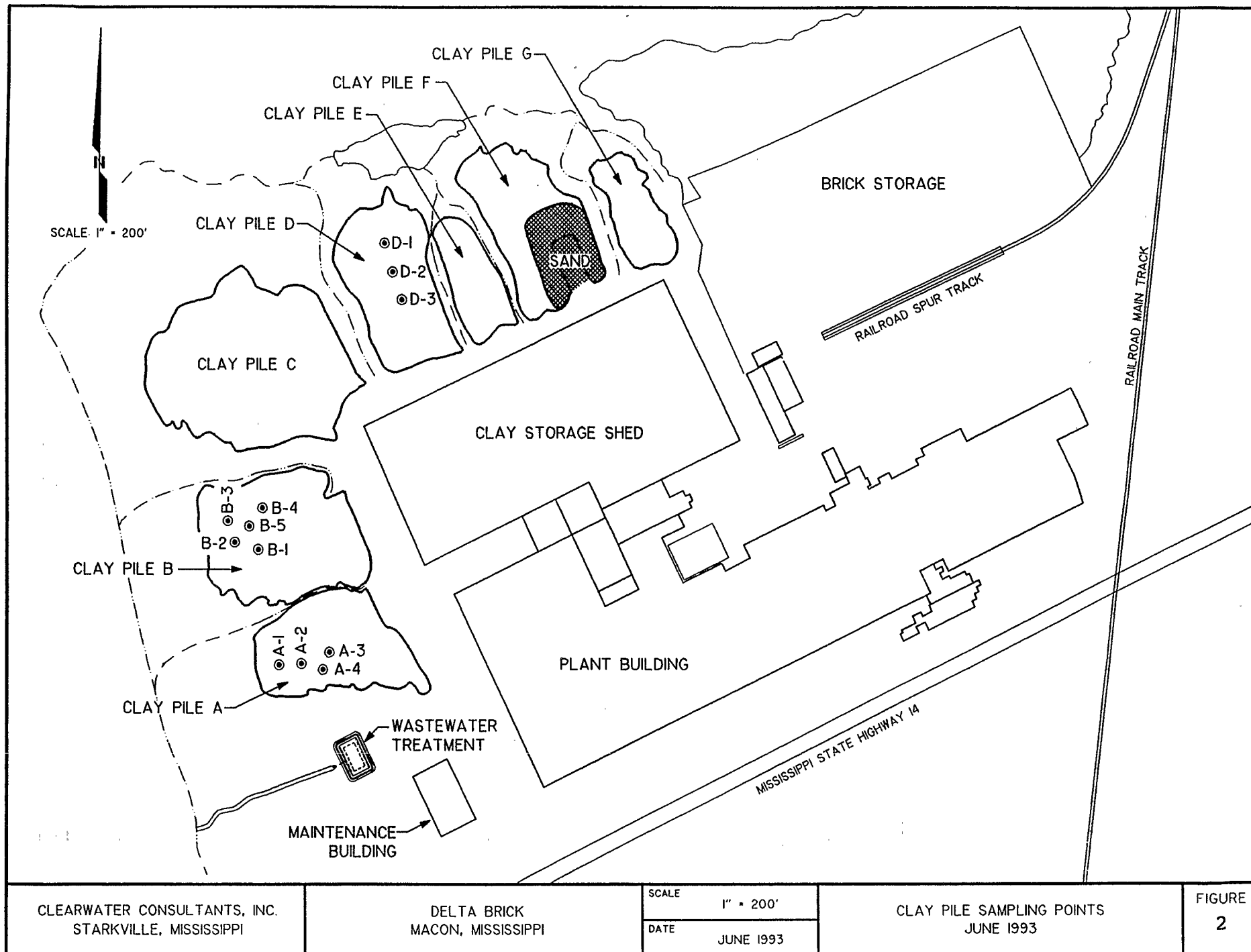
Experimentation described in this report was carried out to assess the potential for the transport of lead from three clay piles located on the property of Delta Brick. Sampling points for each clay pile tested are shown in **Figure 2**.

Each pile was augured through its entire depth and at multiple locations. The entire sample from each hole was collected, thoroughly mixed, and dried at ambient temperature to approximately 20% moisture. Samples from each hole were subjected to the serial batch leach test as described previously. A cookbook procedure for the operation is presented in **Appendix B**. A liquid to solids ratio of 4:1 was used for the testing albeit that ratio would never be seen at the site. However, this represents a conservative approach, it provides sufficient sample for analytical considerations, and represents a significant number of years of leaching.

Dry solid samples were extracted four times with deionized/distilled water. The contact period in each case was 24 hours to allow the water/solid phases to approach equilibrium. The water phase from each extraction was analyzed for lead to determine the leachability of lead. Extracted soil residues were also analyzed for lead (total) in order to obtain a second estimation of the material balance. Test results from a commercial analytical laboratory are presented in **Appendix C**. These data are summarized in **Appendix D** for added clarity.

A forty gram sample of pulverized soil was contacted with 160 ml (grams) of deionized/distilled water. Deionized water was used to closely mimic natural conditions, i.e., rainfall is the condensation of evaporated water. No pH adjustments were made for the same reason. Each of the four extractions used water in the amount of four times the soil sample size, i.e., weight basis. By using rather large volumes of water, a rather long leaching period can be simulated. The period for which each of the extractions represents can be estimated according to the following procedure.

Permeability and hydraulic conductivity data are presented in **Appendix A**. It can be noted that the density of a typical sample of clay soil obtained from Delta Brick would be on the order of 1.538 grams per



cubic centimeter. Therefore, a 1.538 gram sample of clay would be extracted with 6.154 milliliters or cubic centimeters of water (4:1 liquids/solid ratio). Using the equation cited in the previous section,

$$Q = K$$

the volumetric flow can be calculated. As an example, consider flow through a soil with a hydraulic conductivity of 1×10^{-9} cm/sec. Therefore, the volumetric flow is:

$$Q = 1 \times 10^{-9} \text{ cm}^3/\text{sec}.$$

The time required for the water sample to pass through the soil matrix of 1cm x 1cm x 1cm may be estimated by dividing the flow volume by the volumetric flow rate.

$$t/\text{cm} = \frac{\text{volume (cm}^3\text{)}}{Q \text{ (cm}^3\text{/sec)}} = \frac{6.154 \text{ ml}}{1 \times 10^{-9}} = 6.154 \times 10^{+9} \text{ sec}$$

$$t/\text{cm} = (6.154 \times 10^{+9} \text{ sec}) / 86400 \text{ sec/day} = 71,227 \text{ days}$$

$$t/\text{cm} = 195 \text{ years}$$

$$t/\text{in} = 496 \text{ years}$$

$$t/\text{ft} = 5,950 \text{ years}$$

In practical terms, clay with a permeability of 10^{-9} is impervious, it does not conduct water. Even soils with permeabilities that are an order of magnitude higher (10^{-8} cm/sec), would require approximately 3,000 years, or three millennia, for rainwater to travel one foot under conditions prevailing at the site. Since the clay piles in question are on the order of 10 to 30 feet thick, the length of time required for a rain drop entering the surface to pass through the entire depth is beyond comprehension.

In theory as well as reality, the numbers cited above are conservative because the soil is not saturated during summer months when the upper layers dry out and likely is only saturated during the rainy season. The

reality of this situation is that no material transport from these clay piles could occur even if the lead were soluble and there was continuous saturation.

The sequential batch extractions were carried through the fourth extraction using a liquid/solid ratio of 4 to 1. Each extraction yielded a solid residue and a liquid phase. Each phase was analyzed for lead concentration. Communications to the laboratory carrying out the analytical analysis are included in **Appendix E**. Four samples from each location were processed through the first extraction. One sample was removed for testing and the remaining three were processed through the second extraction. Two samples were processed through the third extraction and one through the fourth. One sample was pulled for analysis following each extraction. All samples were centrifuged following each extraction. The liquid phase of the sample to be analyzed was separated from the solid phase and filtered. Those samples to be subjected to further extraction procedures were separated from the liquid, resuspended with distilled water, placed on a shaker for a 24 hour period and the process repeated. These data, along with the appropriate control are plotted in the following graphs. **Figure 1-1** represents Pile A, Hole 1 and **Figure 2-1** represents Pile A, Hole 2. The first bar graph in each figure provides data on the extracted soil from each extraction. It can be seen that even though there was an overall decrease from the original extraction through the fourth extraction, there was not always a decrease from one to the next. This is due to the fact that only very small amounts of lead were extracted and the fact there are slight variations from one analysis to the next.

The second bar chart in each figure represents a calculated value derived from a material balance that takes into account the amount of lead extracted in each extraction. Even though not exact it shows the correct trend that the data should present. The third bar chart shows the maximum concentration of lead in the liquid phase, not the actual value. In each case the concentration was reported as less than 0.1 mg/L but is shown as that value. Therefore the second bar graph in each figure represents this maximum value. These data are most significant because they show that the lead contained in the clay piles are highly insoluble. Therefore, from a **RISK** point of view, the Delta Brick site enjoys the best of both worlds. On the one hand, the clay is so impermeable, no transport would occur even if

the lead were in solution and on the other hand, the solubility is so low that transport would not occur even if the clay were permeable.

6.1 RECOMMENDATIONS

The **RISK** for material transport from the Delta Brick property is very low. There appears to be no significant environmental threat of any sort. It would be most difficult to secure this facility or the material on the facility to any significantly higher extent. The clay piles may be treated as any other solid on the property without significant risk. Some weathering and/or erosion may occur and should be considered in consultation with the engineer. Capping may be considered to preclude this possibility.

Delta Brick
Macon, Mississippi

APPENDIX A

Permeability Data



Springer Engineering, Inc.
206 Glenn Street
Starkville, MS 39759
601-323-2296

October 18, 1993

Clearwater Consultants
Attn: Mr. Carey Hardin, P.E.
P.O. Box 1328
Starkville, MS 39759

RE: PERMEABILITY ANALYSIS
DELTA BRICK - CLAY PILES

Dear Mr. Hardin:

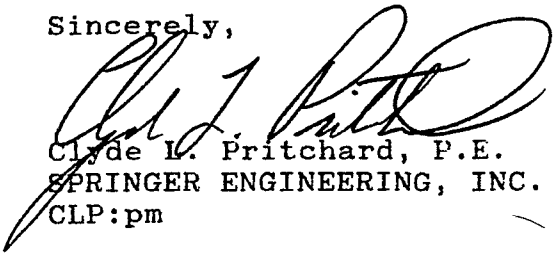
Tabulated below are results of permeability tests performed on samples submitted from the location captioned above. Twelve (12) bulk specimens were submitted for analysis. A single standard proctor curve was generated on a composite material obtained from various samples and the permeability analysis performed on specimens remolded to approximately 90 to 95% of the maximum dry density at a moisture content 1 to 5% above optimum. Laboratory analysis was performed in general accordance with the criteria stipulated by the Corps of Engineers procedure EM 1110-2-1906 Appendix VII and applicable ASTM standards.

<u>SPECIMEN</u> <u>NO.</u>	<u>DRY DENSITY</u> <u>(pcf)</u>	<u>% PROCTOR</u>	<u>%MOISTURE</u>	<u>PERMEABILITY</u> <u>(cm/sec)</u>
A-1	95.1	89.8	19.6	4.3×10^{-9}
A-2	100.7	95.1	20.4	7.7×10^{-9}
A-3	95.7	90.4	22.1	7.6×10^{-9}
A-4	95.7	90.4	24.6	8.9×10^{-9}
B-1	96.4	91.0	22.0	7.7×10^{-9}
B-2	100.0	94.4	19.7	7.9×10^{-9}
B-3	99.3	93.8	20.1	5.4×10^{-9}
B-4	95.7	90.4	23.4	6.3×10^{-9}
B-5	95.9	90.6	22.1	7.9×10^{-9}

D-1	95.9	90.6	21.7	8.7×10^{-9}
D-2	98.7	93.2	21.0	7.1×10^{-9}
D-3	100.1	94.5	18.5	6.1×10^{-9}

Feel free to contact us should you have any questions concerning the data provided or if we may be of additional assistance.

Sincerely,



Clyde L. Pritchard, P.E.
SPRINGER ENGINEERING, INC.
CLP:pm

Delta Brick
Macon, Mississippi

APPENDIX C

Lead
Analytical Data

4723 VIKING DRIVE
BOSSIER CITY, LA 71111

MID-SOUTH
ANALYTICAL LAB

FAX (318) 742-8118
(318) 747-6962
1-800-259-6962

DATE RECEIVED: 09/20/93
REPORT DATE: 09/27/93

CUSTOMER #: 872
REPORT: A2442

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: DONALD O HILL

LOCATION: DELTA BRICK MACON, MS

SAMPLER: DONALD O HILL

METHOD OF SAMPLING: GRAB

COC#: MSL092093EES

TYPE: SOLID/LIQUID

PARAMETER: LEAD
METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XXX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2442A	0 S A1	UNK 8/25/93	768.0	1015 09/24/93
A2442B	1 S A1	UNK 9/8/93	760.0	1017 09/24/93
A2442C	2 S A1	UNK 9/9/93	645.0	1019 09/24/93
A2442D	3 S A1	UNK 9/10/93	647.75	1021 09/24/93
A2442E	4 S A1	UNK 9/11/93	676.5	1023 09/24/93
A2442F	1 L A1	UNK 9/8/93	<0.10	1025 09/24/93
A2442G	2 L A1	UNK 9/9/93	<0.10	1027 09/24/93
A2442H	3 L A1	UNK 9/10/93	<0.10	1029 09/24/93
A2442I	4 L A1	UNK 9/11/93	<0.10	1031 09/24/93

QA/QC : MSL's QC Program is based on Laboratory Quality Control Manual 2nd Edition. USEPA, Region VI and Environmental Resource Association, Arvada, Colorado.

PARAMETERS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.0	0.98	98.0	9/24/93	CGG

PROTOCOL: 17th Edition of Standard Methods for the Examination of Water and Wastewater-EPA Methods for the Analysis of Water and Wastewater- Test Methods for Evaluating Solid Waste (SW-846, 3rd Edition and 40 CFR 136).

> = Greater Than
< = Less Than
ND = Non Detected

Don McConkey

Lab Manager

UNITQC

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BOSSIER CITY, LA 71111

MID-SOUTH
ANALYTICAL LAB

FAX (318) 742-8118
(318) 747-6962
1-800-259-6962

DATE RECEIVED: 09/29/93
REPORT DATE: 10/06/93

CUSTOMER #: 872
REPORT: A2511

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK
SAMPLER: DONALD O HILL
COC#: MSL092993CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2511S	0 S A2	UNK 8/25/93	376.4	1348 10/05/93
A2511T	1 S A2	UNK 9/16/93	390.1	1349 10/05/93
A2511U	1 L A2	UNK 9/16/93	<0.10	1350 10/05/93
A2511V	2 S A2	UNK 9/17/93	342.1	1351 10/05/93
A2511W	2 L A2	UNK 9/17/93	<0.10	1355 10/05/93
A2511X	3 S A2	UNK 9/18/93	361.6	1356 10/05/93
A2511Y	3 L A2	UNK 9/18/93	<0.010	1357 10/05/93
A2511Z	4 S A2	UNK 9/22/93	373.2	1405 10/05/93
A2511AA	4 L A2	UNK 9/22/93	<0.010	1406 10/05/93

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PARAMETERS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.51	101.0	10/5/93	

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CUSTOMER #: 872
REPORT: A2511

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK
SAMPLER: DONALD O HILL
COC#: MSL092993CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2511AT	0 S A3	UNK 8/25/93	653.75	1439 10/05/93
A2511AU	1 S A3	UNK 9/21/93	689.0	1441 10/05/93
A2511AV	1 L A3	UNK 9/21/93	<0.10	1442 10/05/93
A2511AW	2 S A3	UNK 9/22/93	574.9	1444 10/05/93
A2511AX	2 L A3	UNK 9/22/93	<0.10	1445 10/05/93
A2511AY	3 S A3	UNK 9/23/93	552.7	1449 10/05/93
A2511AZ	3 L A3	UNK 9/23/93	<0.10	1450 10/05/93
A2511BA	4 S A3	UNK 9/24/93	599.8	1452 10/05/93
A2511BB	4 L A3	UNK 9/24/93	<0.10	1453 10/05/93

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PARAMETERS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.51	101.0	10/5/93	

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(318) 747-6962
1-800-259-6962

DATE RECEIVED: 10/07/93
REPORT DATE: 10/28/93

CUSTOMER #: 872
REPORT: A2575

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK CLAY PILES

SAMPLER: CAREY HARDIN
COC#: MSL100793CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID/LIQUID

PARAMETER: T LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2575A	0 S A4	UNK 8/25/93	837.0	0958 10/27/93
A2575B	1 S A4	UNK 9/25/93	766.25	0959 10/27/93
A2575C	1 L A4	UNK 9/25/93	0.117	1000 10/27/93
A2575D	2 S A4	UNK 9/26/93	745.25	1001 10/27/93
A2575E	2 L A4	UNK 9/26/93	<0.10	1002 10/27/93
A2575F	3 S A4	UNK 9/28/93	694.0	1003 10/27/93
A2575G	3 L A4	UNK 9/28/93	<0.10	1004 10/27/93
A2575H	4 S A4	UNK 9/29/93	699.25	1005 10/27/93
A2575I	4 L A4	UNK 9/29/93	<0.10	1006 10/27/93

QA/QC : MSL's QC Program is based on Laboratory Quality Control Manual, 2nd Edition. USEPA, Region VI and Environmental Resource Association, Arvada, Colorado.

STANDARDS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.501	100.0	10/27/93	CGG

PROTOCOL: 17th Edition of Standard Methods for the Examination of Water and Wastewater-EPA Methods for the Analysis of Water and Wastewater- Test Methods for Evaluating Solid Waste (SW-846, 3rd Edition and 40 CFR 136).

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CUSTOMER #: 872
REPORT: A2511

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK
SAMPLER: DONALD O HILL
COC#: MSL092993CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES:XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2511A	0 S B1	UNK 8/25/93	647.4	1316 10/05/93
A2511B	1 S B1	UNK 9/14/93	642.5	1317 10/05/93
A2511C	1 L B1	UNK 9/14/93	<0.10	1318 10/05/93
A2511D	2 S B1	UNK 9/15/93	654.0	1320 10/05/93
A2511E	2 L B1	UNK 9/15/93	<0.10	1321 10/05/93
A2511F	3 S B1	UNK 9/16/93	581.4	1323 10/05/93
A2511G	3 L B1	UNK 9/16/93	<0.10	1324 10/05/93
A2511H	4 S B1	UNK 9/17/93	684.0	1325 10/05/93
A2511I	4 L B1	UNK 9/17/93	<0.10	1326 10/05/93

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PARAMETERS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.51	101.0	10/5/93	

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109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK
SAMPLER: DONALD O HILL
COC#: MSL092993CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2511AB	0 S B2	UNK 8/25/93	856.0	1407 10/05/93
A2511AC	1 S B2	UNK 9/17/93	725.5	1410 10/05/93
A2511AD	1 L B2	UNK 9/17/93	<0.10	1411 10/05/93
A2511AE	2 S B2	UNK 9/20/93	825.75	1415 10/05/93
A2511AF	2 L B2	UNK 9/20/93	<0.10	1416 10/05/93
A2511AG	3 S B2	UNK 9/22/93	765.75	1417 10/05/93
A2511AH	3 L B2	UNK 9/22/93	<0.10	1418 10/05/93
A2511AI	4 S B2	UNK 9/24/93	840.75	1421 10/05/93
A2511AJ	4 L B2	UNK 9/24/93	<0.10	1422 10/05/93

QA/QC : MSL's QC Program is based on Laboratory Quality Control Manual 2nd Edition. USEPA, Region VI and Environmental Resource Association, Arvada, Colorado.

PARAMETERS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.51	101.0	10/5/93	

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BOSSIER CITY, LA 71111

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DATE RECEIVED: 10/07/93
REPORT DATE: 10/28/93

CUSTOMER #: 872
REPORT: A2575

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK CLAY PILE

SAMPLER: CAREY HARDIN

METHOD OF SAMPLING: GRAB

COC#: MSL100793CC

TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2575J	0 S B3	UNK 8/25/93	442.5	1007 10/27/93
A2575K	1 S B3	UNK 9/23/93	456.0	1008 10/27/93
A2575L	1 L B3	UNK 9/23/93	<0.10	1009 10/27/93
A2575M	2 S B3	UNK 9/25/93	459.0	1010 10/27/93
A2575N	2 L B3	UNK 9/25/93	<0.10	1011 10/27/93
A2575O	3 S B3	UNK 9/27/93	459.25	1012 10/27/93
A2575P	3 L B3	UNK 9/27/93	<0.10	1013 10/27/93
A2575Q	4 S B3	UNK 9/28/93	454.0	1027 10/27/93
A2575R	4 L B3	UNK 9/28/93	<0.10	1028 10/27/93

QA/QC : MSL's QC Program is based on Laboratory Quality Control Manual 2nd Edition. USEPA, Region VI and Environmental Resource Association, Arvada, Colorado.

<u>STANDARDS</u>	<u>ACTUAL</u>	<u>RECOVERED</u>	<u>% EFFICIENCY</u>	<u>DATE</u>	<u>TECH</u>
LEAD	1.5	1.501	100.0	10/27/93	CGG

PROTOCOL: 17th Edition of Standard Methods for the Examination of Water and Wastewater-EPA Methods for the Analysis of Water and Wastewater- Test Methods for Evaluating Solid Waste (SW-846, 3rd Edition and 40 CFR 136).

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(318) 747-6962
1-800-259-6962

DATE RECEIVED: 10/07/93
REPORT DATE: 10/28/93

CUSTOMER #: 872
REPORT: A2575

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK CLAY PILE

SAMPLER: CAREY HARDIN

METHOD OF SAMPLING: GRAB

COC#: MSL100793CC

TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2575S	0 S B4	UNK 8/25/93	742.0	1029 10/27/93
A2575T	1 S B4	UNK 9/28/93	630.0	1030 10/27/93
A2575U	1 L B4	UNK 9/28/93	<0.10	1031 10/27/93
A2575V	2 S B4	UNK 9/29/93	586.0	1032 10/27/93
A2575W	2 L B4	UNK 9/29/93	<0.10	1033 10/27/93
A2575X	3 S B4	UNK 10/1/93	656.0	1034 10/27/93
A2575Y	3 L B4	UNK 10/1/93	<0.10	1035 10/27/93
A2575Z	4 S B4	UNK 10/2/93	593.5	1036 10/27/93
A2575AA	4 L B4	UNK 10/2/93	<0.10	1037 10/27/93

QA/QC : MSL's QC Program is based on Laboratory Quality Control Manual 2nd Edition. USEPA, Region VI and Environmental Resource Association, Arvada, Colorado.

<u>STANDARDS</u>	<u>ACTUAL</u>	<u>RECOVERED</u>	<u>% EFFICIENCY</u>	<u>DATE</u>	<u>TECH</u>
LEAD	1.5	1.501	100.0	10/27/93	CGG

PROTOCOL: 17th Edition of Standard Methods for the Examination of Water and Wastewater-EPA Methods for the Analysis of Water and Wastewater- Test Methods for Evaluating Solid Waste (SW-846, 3rd Edition and 40 CFR 136).

> = Greater Than
< = Less Than

UNITQC

L. V. Loh
Lab Manager

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4723 VIKING DRIVE
BOSSIER CITY, LA 71111

MID-SOUTH
ANALYTICAL LAB

FAX (318) 742-8118
(318) 747-6962
1-800-259-6962

DATE RECEIVED: 10/07/93
REPORT DATE: 10/28/93

CUSTOMER #: 872
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COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
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CLIENT: C HARDIN

LOCATION: DELTA BRICK CLAY PILE
SAMPLER: CAREY HARDIN METHOD OF SAMPLING: GRAB
COC#: MSL100793CC TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2575AB	0 S B5	UNK 8/25/93	1066.25	1038 10/27/93
A2575AC	1 S B5	UNK 9/30/93	944.25	1039 10/27/93
A2575AD	1 L B5	UNK 9/30/93	<0.10	1040 10/27/93
A2575AE	2 S B5	UNK 10/1/93	1141.25	1041 10/27/93
A2575AF	2 L B5	UNK 10/1/93	<0.10	1042 10/27/93
A2575AG	3 S B5	UNK 10/2/93	1088.0	1043 10/27/93
A2575AH	3 L B5	UNK 10/2/93	<0.10	1044 10/27/93
A2575AI	4 S B5	UNK 10/4/93	1039.5	1045 10/27/93
A2575AJ	4 L B5	UNK 10/4/93	<0.10	1046 10/27/93

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STANDARDS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.501	100.0	10/27/93	CGG

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UNITQC

L. V. [Signature]
Lab Manager

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(318) 747-6962
1-800-259-6962

DATE RECEIVED: 09/29/93
REPORT DATE: 10/06/93

CUSTOMER #: 872
REPORT: A2511

COMPANY: CLEARWATER CONSULTANTS
109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK
SAMPLER: DONALD O HILL
COC#: MSL092993CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2511J	0 S D1	UNK 8/25/93	338.0	1330 10/05/93
A2511K	1 S D1	UNK 9/15/93	308.8	1332 10/05/93
A2511L	1 L D1	UNK 9/15/93	<0.10	1333 10/05/93
A2511M	2 S D1	UNK 9/16/93	355.3	1334 10/05/93
A2511N	2 L D1	UNK 9/16/93	<0.10	1335 10/05/93
A2511O	3 S D1	UNK 9/17/93	310.9	1339 10/05/93
A2511P	3 L D1	UNK 9/17/93	<0.10	1340 10/05/93
A2511Q	4 S D1	UNK 9/18/93	304.2	1343 10/05/93
A2511R	4 L D1	UNK 9/18/93	<0.10	1344 10/05/93

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PARAMETERS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.51	101.0	10/5/93	

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ND = Non Detected

UNITQC

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CLIENT: C HARDIN

LOCATION: DELTA BRICK
SAMPLER: DONALD O HILL
COC#: MSL092993CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2511AK	0 S D2	UNK 8/25/93	454.0	1423 10/05/93
A2511AL	1 S D2	UNK 9/20/93	446.0	1429 10/05/93
A2511AM	1 L D2	UNK 9/20/93	<0.10	1430 10/05/93
A2511AN	2 S D2	UNK 9/21/93	376.2	1432 10/05/93
A2511AO	2 L D2	UNK 9/21/93	<0.10	1433 10/05/93
A2511AP	3 S D2	UNK 9/23/93	393.8	1435 10/05/93
A2511AQ	3 L D2	UNK 9/23/93	<0.10	1436 10/05/93
A2511AR	4 S D2	UNK 9/24/93	406.9	1437 10/05/93
A2511AS	4 L D2	UNK 9/24/93	<0.10	1438 10/05/93

QA/QC : MSL's QC Program is based on Laboratory Quality Control Manual 2nd Edition. USEPA, Region VI and Environmental Resource Association, Arvada, Colorado.

PARAMETERS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.51	101.0	10/5/93	

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109 NORTH JACKSON ST
P O BOX 1328
STARKVILLE MS 39759

CLIENT: C HARDIN

LOCATION: DELTA BRICK CLAY PILE

SAMPLER: CAREY HARDIN
COC#: MSL100793CC

METHOD OF SAMPLING: GRAB
TYPE: SOLID

PARAMETER: LEAD

METHOD: 3500Pb B

UNIT OF MEASURE: ppm

TECHNICIAN: CGG

DETECTION LIMIT: 0.10

CHAIN OF CUSTODY SEAL INTACT? YES: XX NO:

SAMPLE NUMBER	SAMPLE ID	TIME/DATE COLLECTED	RESULTS	TIME/DATE ANALYSIS
A2575AK	0 S D3	UNK 8/25/93	124.25	1047 10/27/93
A2575AL	1 S D3	UNK 9/24/93	39.1	1050 10/27/93
A2575AM	1 L D3	UNK 9/24/93	<0.10	1055 10/27/93
A2575AN	2 S D3	UNK 9/25/93	41.02	1056 10/27/93
A2575AO	2 L D3	UNK 9/25/93	<0.10	1057 10/27/93
A2575AP	3 S D3	UNK 9/26/93	40.99	1058 10/27/93
A2575AQ	3 L D3	UNK 9/26/93	<0.10	1059 10/27/93
A2575AR	4 S D3	UNK 9/27/93	38.77	1100 10/27/93
A2575AS	4 L D3	UNK 9/27/93	<0.10	1101 10/27/93

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STANDARDS	ACTUAL	RECOVERED	% EFFICIENCY	DATE	TECH
LEAD	1.5	1.501	100.0	10/27/93	CGG

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UNITQC

Lab Manager

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M E M O

TO: File
FROM: David Lee
SUBJECT: Meeting with Boral Brick officials
DATE: August 31, 1995

On this date, I met with Boral Brick officials to discuss the results of the soil extraction study performed by Dr. Hill of Mississippi State University. The results of the study were discussed by Dr. Hill, then a general discussion ensued about such details as the pH of the extraction water, Ph of the water in the clay piles, average lead levels in the piles, etc. Following this, we then discussed the firm's options for managing the clay piles.

I asked Dr. Hill about the pH of the extraction water. The water used was deionized, with a pH near neutral. The pH of the water in the pile samples was not taken. I asked Dr. Hill about the pH of rainwater, whether it was significantly lower than neutral. He said that sometimes CO₂ and other compounds in the air can affect the pH of rainwater initially, but after a brief period, the pH becomes more neutral. He also stated, that since the clay in the piles has a permeability in the 10⁻⁹ range, that very little rainwater ever enters the piles. The multiple batch extraction tests performed on the samples are used by the Corps of Engineers to determine likely leaching of constituents from dredge spoils. These tests showed the clay samples leached lead in concentrations of about 0.1 ppm. The clay was ground to the consistency of talc, then extracted for 24 hours. The conclusion was that since the clay is very impermeable, little water is likely to pass through the clay, and if it does, it will leach very little lead.

Officials from Boral then discussed options for managing the clay. Possibilities mentioned were:

- Spreading and cover on-site
- Use as sanitary landfill cover or intermediate cover
- Use as old clay mine site fill to reclaim the land

Reference 4

Use as landfill intermediate cover was ruled out, since the pH in the fill could be low, leaching out lead. Use as a final cover was also ruled out, since there would be no control over eventual site use by Boral, and potential exposure of people to the lead in the future is possible, if the site were used for housing, parks, etc.

I talked to Mark Williams about off-site management. He said a permit would likely be required. A permit may not be necessary for on-site management. He would need information on quantity of soil, lead content, geology. I sent a copy of the Solid Waste regs to Carey Hardin and Ed Thebaud. They will contact Mark and will make a decision on which type of disposal option they will pursue.

Ed Thebaud
Box 1178
Columbus, GA 31902
334.480.2486

Note to File - 4/8/92

On this date I returned to the Curtis Nicholson property in Mason to re-sample. I intended to sample in the sediment-filled ditch which drains north from the brick plant. Samples were to be taken from 3 depths to see if stratification of load had occurred.

Upon arrival, I found Marc Beutrud & Don Barnett of Barnett Law Office and two attorneys representing Delta Brick. Delta's attorneys were present to point out a finding they had made. We reviewed the county tax assessor's property maps for the area. According to the attorneys, Mr. Nicholson's property does not begin where he had been telling us, but 660' to the north of that point.

We walked back to the section line of Mr. N's property, according to the maps, and everyone agreed this was correct. 4 samples were taken just to the north of this line, at 3 depths (1-6"; 7-12", 13-18"). This will be analyzed for total load.

If this determination is correct, the contamination from Delta Brick will likely not be on Mr. N's property, and we will not be dealing with him further.

D. See

4/8/92



STATE OF MISSISSIPPI

DEPARTMENT OF ENVIRONMENTAL QUALITY

RAY MABUS
GOVERNOR

MEMORANDUM

TO: ~~BILL STEWART~~ *David Lee*
FROM: AARON HARTHCOCK
SUBJECT: DELTA BRICK PLANT - NOXUBEE COUNTY
DATE: October 15, 1990 *up from 21, 1991*

On October 10, 1990, I investigated a complaint of discharging onto Mr. Nicholson's property. The site is approximately (1) one mile Southwest of Macon, MS on Hwy. 14.

There is water draining from the Delta Brick Plant's rain water and wash water operations into a ditch on the north that drains onto Mr. Nicholson's property. Although the water discharges onto Delta Brick's property, there is water draining onto Mr. Nicholson's property located approximately 25 to 30 feet to the North. Mr. Nicholson did not know exactly where his property boundary line was, but he told me that he owned (23) acres and Delta Brick Co. owned (23) acres. Mr. Nicholson informed me that he was planning on having his property surveyed, cutting down the trees, and planting a vegetable garden on his property. (see Photo's taken)

There is another water drainage ditch on the West side of Delta Brick Co. that drains into the nearby marsh area. The water is generated from the air compressor coolant holding tank area. (see photo's taken)

There is an area on the Northwest of Delta Brick's property where empty oil barrels are stored, but Mr. Jimmy Campbell (Safety officer-Delta Brick Co.) and Mr. Joey Cooper (Production Mgr. Delta Brick Co.) told me would have taken to a landfill by October 10, 1990.

I was informed by Mr. Joel Cooper And Mr. Jimmy Campbell that at one time Litharge, Lead Oxide, and Red Lead was used by Delta Brick Co. in the making of bricks, but has terminated the usage of these chemicals since November, 1989. Lead and total metal soil samples for BPC Laboratory analysis was taken of the

North water discharge ditch and the West water discharge ditch. Delta Brick Co. and Mr. Nicholson would like to receive a copy of this report and a copy of the soil laboratory analysis report.

Enclosed with this report is a chemical inventory that Delta Brick uses presently, a topographical map with details of this area, and photographs taken of this area. If I can be of further assistance, please call.

Mr. Curtis Nicholson (929-3467)
1010 6th Ave. N
P. O. Box 1204
Columbus, MS 39703

Mr. Ron Poley, Manager
Delta Brick Co. (793-4236)
Rt. # 4, Box 2
Hwy. 14, West
Macon, MS 39341

(Corp. Office)
Boral Bricks Inc.
P.O. Box 1957
Arthern Road
Augusta, GA 30913

3-8000
3-2200 Fax

September 18, 1991

Mr. David Lee, P.E.
Hazardous Waste Division
Office of Pollution Control
Post Office Box 10385
Jackson, Mississippi 39289-0385

RE: Preliminary Laboratory Results
Site Investigation
Delta Brick - Macon, Mississippi

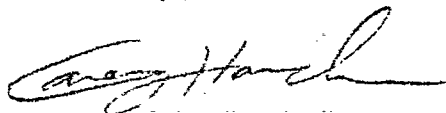
Dear David:

Please find enclosed the preliminary results for metals concentrations for the sampling performed September 9th and 10th. Also enclosed is a site map indicating the locations of the samples.

As indicated in the Workplan, the samples appropriate for TCLP analysis need to be determined. I will contact you later today to discuss this matter.

We appreciate your cooperation and assistance with this matter.

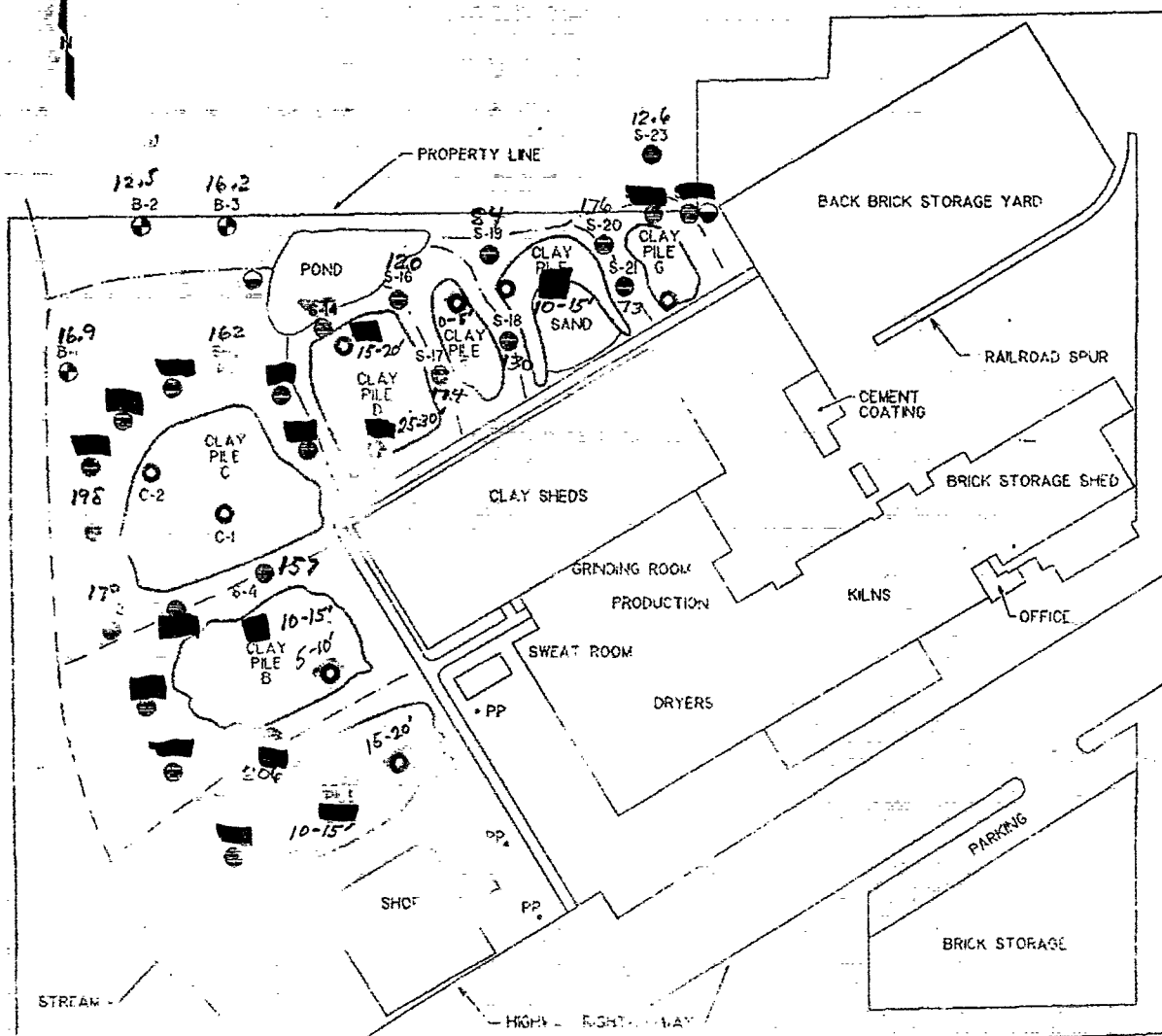
Sincerely,



Carey Hardin, P.E.
CLEARWATER CONSULTANTS, INC.

Copy to Mr. Ron Polen, Vice President/General Manager, Delta Brick

Post-It [®] brand fax transmittal memo 7671		* of pages 4	
To	David Lee	From	C Hardin
Co.	OPC	Co.	Clearwater
Dept.	Haz Waste	Phone #	323-8000
Fax #	354-6612	Fax #	323-2200



- samples > 1000 ppm total lead
- total lead > 250 ppm + < 1000 ppm
- total lead > 200 ppm + < 250 ppm

LEGEND

- SOIL SAMPLE (SURFACE)
- SEDIMENT SAMPLE (SURFACE)
- CLAY PILE SAMPLE - DEPTH VARIES
- WATER SAMPLE

PRELIMINARY SITE INVESTIGATION
SAMPLING PLAN

FIGURE
3

CLEARWATER CONSULTANTS, INC.
STARKVILLE, MISSISSIPPI

DELTA BRICK, INC.
MACON, MISSISSIPPI

INTERIM EVALUATION
OCTOBER 1991

TOTAL METAL RESULTS

will run
TCLP on
these ✓
4

SAMPLE #	Barium	Chromium	Cadmium	Lead
1481A S-1	218.6	19.6	0.66	198.0
B S-2	175.8	20.9	0.5	178.9
C S-3	104.5	14.4	0.54	157.1
D S-4	175.7	16.9	1.34	157.1
E S-5	199.8	28.9	0.44	157.1
F S-6	241.8	20.8	1.26	576.7
G S-7	49.1	6.9	0.46	576.7
H S-8	241.2	27.9	0.56	576.7
I S-9	210.8	21.5	2.04	644.5
J S-10	228.7	23.0	0.66	386.2
K S-11	158.0	18.6	0.62	386.2
L S-12	188.9	19.3	0.42	259.2
M S-13	101.7	20.2	0.5	161.8
N S-14	111.4	23.7	0.4	381.8
O S-15	149.1	14.9	<0.000	1108.5 ✓
P S-16	174.2	19.7	<0.000	393
Q S-17	84.5	20.1	0.42	20.4
R S-18	35.9	10.2	<0.000	174.0
S S-19	72.1	19.9	0.44	130
T S-20	106.6	25.7	0.44	84.0
U S-21	11.1	4.6	<0.000	176
V S-22	177.3	35.3	0.5	73.3
W S-23	10.0	8.9	<0.000	✓477.6
X S-24	118.2	36.1	<0.000	17.6
YA(0-5)	138.3	24.7	0.46	17.6
ZA(5-10)	142.2	19.7	0.52	17.6
AA(0-15)	220.6	25.3	0.56	17.6
BB(5-20)	159.3	34.3	0.56	17.6
CC(0-5)	133.0	28.4	0.56	50.8
DD(5-10)	101.4	46.4	0.4	322
EE(0-15)	228.9	41.8	0.44	166.4
FF(5-20)	276.6	22.7	0.48	166.4
			<0.000	441.5
				397.5
				120.8

Location Sample #BariumChromiumCadmiumLead

C (0-5) GG

111.1

18.3

<0.020

30.9

C (5-10) HH

80.4

24.6

<0.020

19.7

C (10-15) II

157.1

27.9

0.48

24.3

C (15-20) JJ

139.6

21.5

0.46

24.1

D-1 (0-5) KL

150.4

18.6

<0.020

20.2

D-1 (5-10) LL

124.5

18.9

<0.020

19.8

D-1 (10-15) MM

177.3

25.3

0.11

29.7

D-1 (15-20) NN

180.9

23.3

0.42

38.4

D-1 (20-25) OO

88.6

17.6

0.52

42.9

D-1 (25-30) PP

199.2

32.3

<0.020

[REDACTED]

D-1 (0-5) QQ

110.7

19.6

0.42

31.9

F (0-5) RR

148.7

17.5

<0.020

[REDACTED]

F (5-10) SS

181.7

23.1

0.46

[REDACTED]

F (10-15) TT

29.3

15.6

<0.020

23.7

F (15-20) UU

198.6

20.1

<0.020

23.5

Q-2 (0-5) VV

74.8

18.1

<0.020

23.8

Q-2 (5-10) WW

194.8

20.5

<0.020

[REDACTED]

U-2 (15-10) XX

202.8

34.0

<0.020

1730.4 ✓

EE (0-5) YY

63.6

22.6

<0.020

773.5 ✓

EE (5-10) ZZ

141.3

25.1

<0.020

[REDACTED]

EE (10-15) AA

70.2

12.6

<0.020

44.4

J-1 (0-5) AC

229.6

17.1

0.44

67.8

J-1 (0-5) AD

222.1

15.1

0.44

106.0

G-1 (5-10) AE

217.6

22.8

<0.020

162.6

G-1 (10-15) AF

51.8

26.8

0.52

[REDACTED]

Q-2 AG

17.9

12.7

<0.020

13.5

Q-3 AH

24.2

12.8

<0.020

16.2

Q-4 AI

15.0

10.0

<0.020

12.0

C-2 (4-8) AJ

152.3

75.5

0.42

17.7

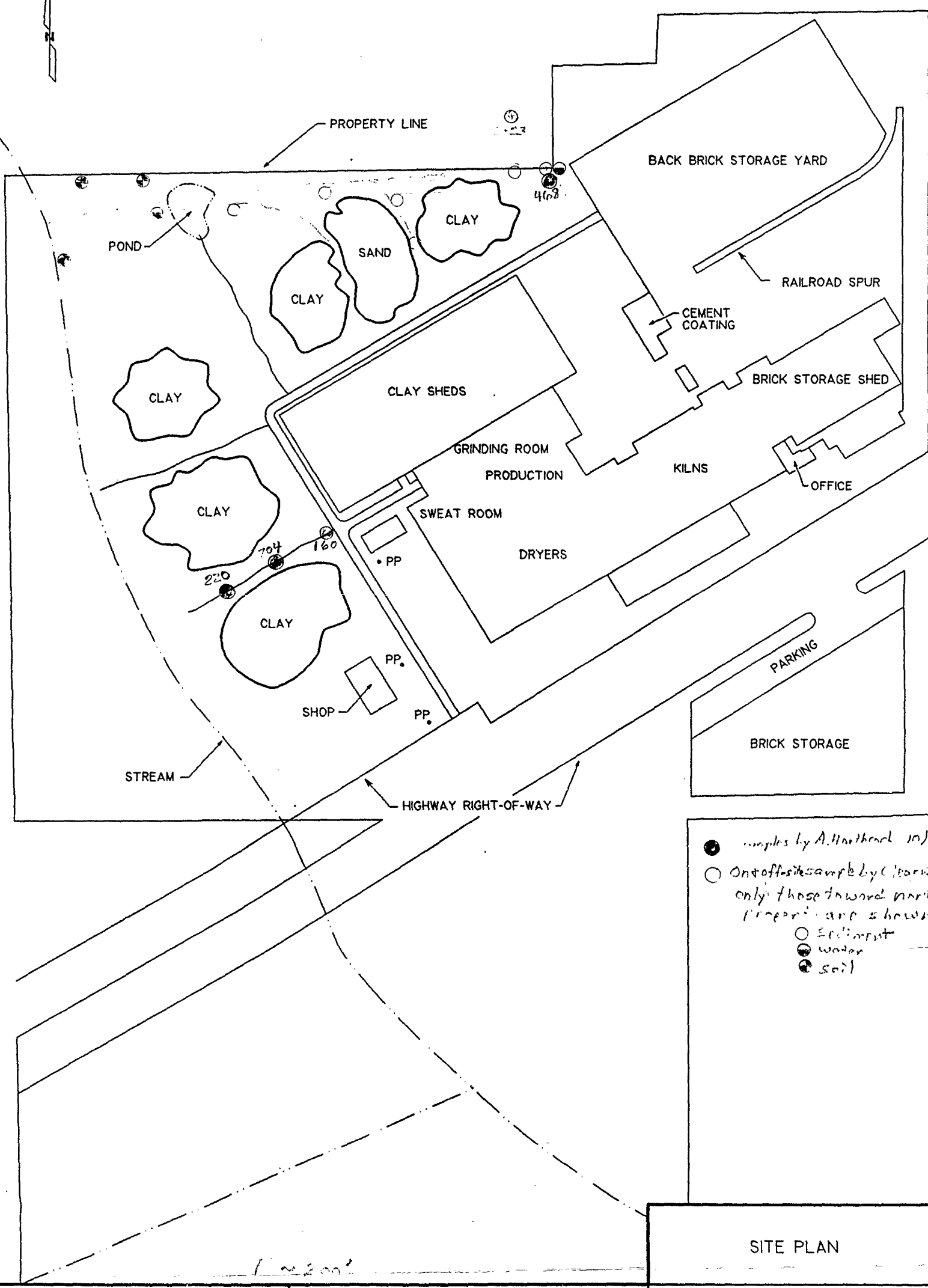
C-2 (1-4) AK

131.6

18.7

<0.020

[REDACTED]



● samples by A. Hawthorn 10/1/90 m/t/g 'end
 ○ On/off-site sample by Clearwater 8/91
 only those toward north side of
 property are shown
 ○ Sediment
 ● Water
 ● Soil

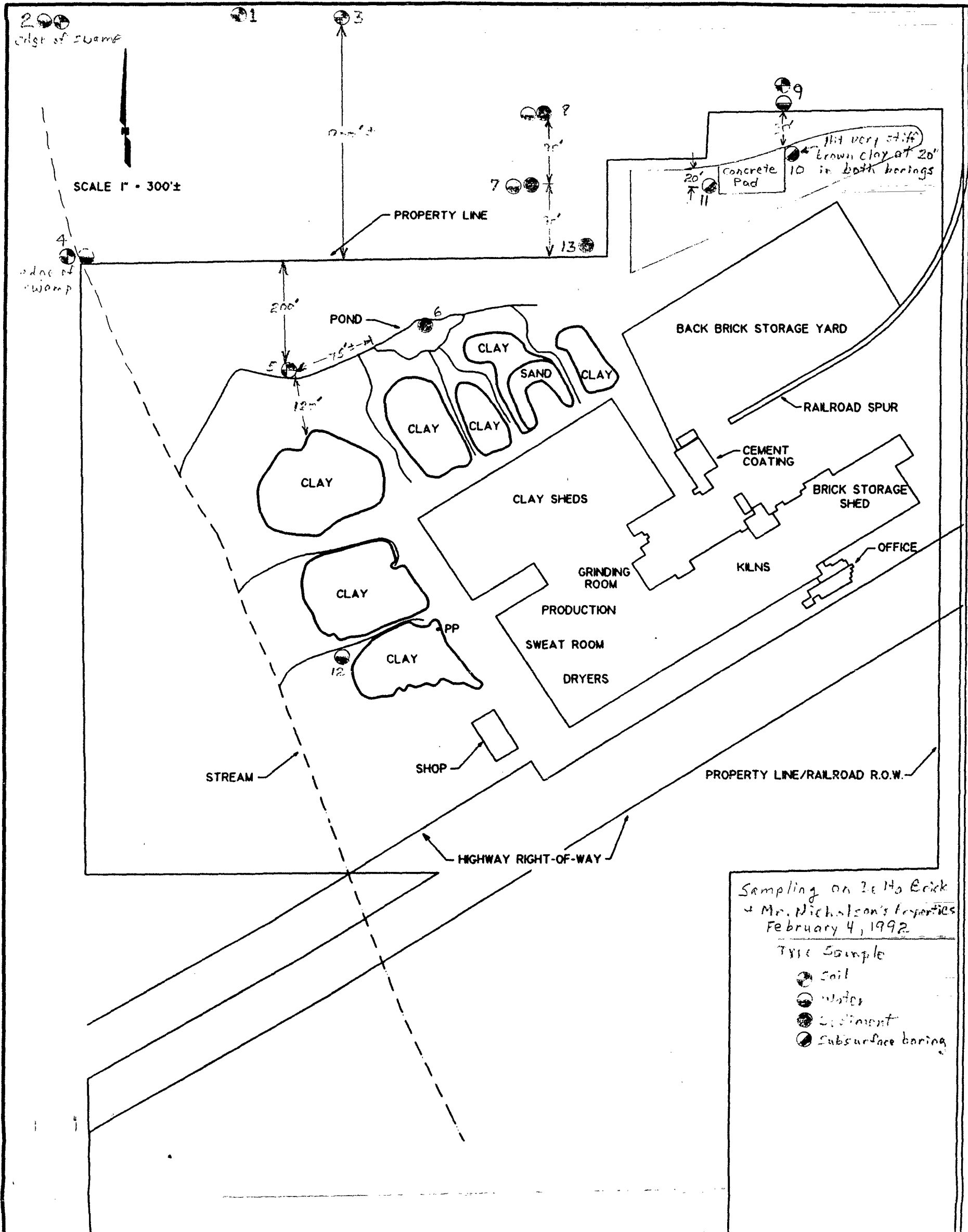
SITE PLAN

FIGURE
2

CLEARWATER CONSULTANTS, INC.
STARKVILLE, MISSISSIPPI

DELTA BRICK, INC.
MACON, MISSISSIPPI

SITE INVESTIGATION WORKPLAN
JUNE 1991



SITE PLAN

FIGURE
2

CLEARWATER CONSULTANTS, INC.
STARKVILLE, MISSISSIPPI

DELTA BRICK, INC.
MACON, MISSISSIPPI

ENGINEERING REPORT
NOVEMBER 1991

Lab Bench No. 554

Copy sent to Carter Harlan
+ Isaac Brewster in 192

II. SAMPLE IDENTIFICATION:

Where Taken 1-6" denth

	<u>Type</u>	<u>Parameters</u>	<u>Preservative</u>	<u>Date</u>	<u>Time</u>
1.	Grab	Total Lead		4/8/92	1215
2.					
3.					
4.					
5.					

<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

V. LABORATORY: Received By David Singleton Date 4/10/92 Time 1000

Recorded By Dorothy Lewis Date Sent to State Office 5-70-92

[illegible]

Remarks

*Date of Test Initiation

Lab Bench No. 555

II. SAMPLE IDENTIFICATION:
Environment Condition _____ Collected By D.Lee

II. FIELD:					
<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()	_____	_____	_____
D.O.	(000300)	()	_____	_____	_____
Temperature	(000010)	()	_____	_____	_____
Residual Chlorine	(050060)	()	_____	_____	_____
Flow	(074060)	()	_____	_____	_____

IV. TRANSPORTATION OF SAMPLE: Bus () RO Vehicle () Other ()

V. LABORATORY: Received By David Singleton Date 4/10/92 Time 1000
Recorded By Dorothy Lewis Date Sent to State Office 5-20-92

[illegible]

Remarks

*Date of Test Initiation

Lab Bench No. 556

II. SAMPLE IDENTIFICATION:
Environment Condition Collected By D.Lee

Environment Condition _____ Collected By D. Lee
Where Taken 13-18" depth

II. FIELD:

IV. TRANSPORTATION OF SAMPLE: Bus () RO Vehicle () Other ()

V. LABORATORY: Received By David Singleton Date 4/10/92 Time 1000
Recorded By Dorothy Lewis Date Sent to State Office 5-20-92

[illegible]

*Date of Test Initiation

Lab Bench No. 189

II. SAMPLE IDENTIFICATION:
Environment Condition _____ Collected By D.Lee/S.Hamdi
Where Taken _____

<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

[illegible]

Remarks

*Date of Test Initiation

Lab Bench No. 188

II. SAMPLE IDENTIFICATION:

	<u>Type</u>	<u>Parameters</u>	<u>Preservative</u>	<u>Date</u>	<u>Time</u>
1.	Soil - B	Total Lead		2/4/92	
2.					
3.					
4.					
5.					

<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()	_____	_____	_____
D.O.	(000300)	()	_____	_____	_____
Temperature	(000010)	()	_____	_____	_____
Residual Chlorine	(050060)	()	_____	_____	_____
Flow	(074060)	()	_____	_____	_____

V. LABORATORY: Received By Otis Clark Date 2/5/92 Time 1025
Recorded By Dorothy Lewis Date Sent to State Office 3-5-92

Remarks

*Date of Test Initiation

Lab Bench No. 187

II. SAMPLE IDENTIFICATION:
Environment Condition _____ Collected By D.Lee/S.Hamdi
Where Taken _____

<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

[illegible][illegible]

*Date of Test Initiation

Lab Bench No. 186

II. SAMPLE IDENTIFICATION:
 Environment Condition _____ Collected By D.Lee/S.Hamdi
 Where Taken _____

II. FIELD:					
<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

[illegible]

Remarks

*Date of Test Initiation

Lab Bench No. 185

II. SAMPLE IDENTIFICATION:

	Type	Parameters	Preservative	Date	Time
1.	Soil-B	Total Lead		2/4/92	
2.	Water (W8)A	Total Lead		2/4/92	
3.					
4.					
5.					

II. FIELD:

IV. TRANSPORTATION OF SAMPLE: Bus () RO Vehicle () Other ()

Computer _____ Date _____

Computer _____ Date _____

[illegible]

Remarks

*Date of Test Initiation

Lab Bench No. 184

*Date of Test Initiation

Lab Bench No. 183

II. SAMPLE IDENTIFICATION:
Environment Condition

<u>I. FIELD:</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
<u>Analysis</u>					
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

V. LABORATORY: Received By Otis Clark Date 2/5/92 Time 1025
Recorded By Dorothy Lewis Date Sent to State Office 3-5-92

[illegible]

*Date of Test Initiation

Lab Bench No. 182

County Code _____ NPDES Permit No. _____
 Discharge No. _____ Date Requested 2/5/92
 Sample Point Identification 5
 Requested By David Lee Data To David Lee
 Type of Sample: Grab (X) Composite (Flow) (Time) Other ()

Environment Condition _____ Collected By D.Lee/S.Hamdi
Where Taken _____

	<u>Type</u>	<u>Parameters</u>	<u>Preservative</u>	<u>Date</u>	<u>Time</u>
1.	Soil B	Total Lead		2/4/92	
2.					
3.					
4.					
5.					

<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

Recorded By Dorothy Lewis Date Sent to State Office 3-5-92

[illegible]

*Date of Test Initiation

Lab Bench No. 181

II. SAMPLE IDENTIFICATION:
 Environment Condition _____ Collected By D.Lee/S.Hamdi
 Where Taken _____

III. FIELD:					
<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

V. LABORATORY: Received By Otis Clark Date 2/5/92 Time 1025
Recorded By Dorothy Lewis Date Sent to State Office 3-5-92

[illegible]

*Date of Test Initiation

Lab Bench No. 180

II. SAMPLE IDENTIFICATION:
Environment Condition _____ Collected By D.Lee/S.Hamdi
Where Taken _____

II. FIELD:					
<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()	_____	_____	_____
D.O.	(000300)	()	_____	_____	_____
Temperature	(000010)	()	_____	_____	_____
Residual Chlorine	(050060)	()	_____	_____	_____
Flow	(074060)	()	_____	_____	_____

[illegible]

*Date of Test Initiation

Lab Bench No. 178

II. SAMPLE IDENTIFICATION:
 Environment Condition N/A Collected By Saad/David
 Where Taken N/A

<u>Analysis</u>	<u>Computer Code</u>	<u>Request</u>	<u>Results</u>	<u>Analyst</u>	<u>Date</u>
pH	(000400)	()			
D.O.	(000300)	()			
Temperature	(000010)	()			
Residual Chlorine	(050060)	()			
Flow	(074060)	()			

V. LABORATORY: Received By Otis Clark Date 2/5/92 Time 1025
Recorded By Dorothy Lewis Date Sent to State Office 3-5-92

[illegible]

Remarks

*Date of Test Initiation

BUREAU OF POLLUTION CONTROL
SAMPLE REQUEST FORM

Lab Bench No. 1463

I. GENERAL INFORMATION: Facility Name Delta Brick Inc. (Boral Brick)
County Code 2000 Noxubee NPDES Permit No. _____
Discharge No. _____ Date Requested 10/10/90
Sample Point Identification Ditch on north side of facility
Requested By Bill Stewart Data To Bill Stewart
Type of Sample: Grab (X) Composite (Flow) (Time) Other ()

II. SAMPLE IDENTIFICATION:
Environment Condition Cool/overcast Collected By A. Harthcock
Where Taken Ditch on north side of facility

Type	Parameters	Preservative	Date	Time
1. Grab-soil sample	Pb	Soil Samples	10/9/90	1430
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____

III. FIELD:

Analysis	Computer Code	Request	Results	Analyst	Date
pH	(000400)	()	_____	_____	_____
D.O.	(000300)	()	_____	_____	_____
Temperature	(000010)	()	_____	_____	_____
Residual Chlorine	(050060)	()	_____	_____	_____
Flow	(074060)	()	_____	_____	_____

IV. TRANSPORTATION OF SAMPLE: Bus () RO Vehicle () Other ()
V. LABORATORY: Received By David Singleton Date 10/11/90 Time 900
Recorded By Dorothy Lewis Date Sent to State Office 11-10-90

Analysis	Computer Code	Request	Result	Analyst	Date Measured
BOD ₅	(000310)	()	mg/l	_____	*
COD	(000340)	()	mg/l	_____	_____
TOC	(000680)	()	mg/l	_____	_____
Suspended Solids	(099000)	()	mg/l	_____	_____
TKN	(000625)	()	mg/l	_____	_____
Ammonia-N	(000610)	()	mg/l	_____	_____
Fecal Coliform(1)	(074055)	()	colonies/100 ml	_____	*
Fecal Coliform(2)	(074055)	()	colonies/100 ml	_____	*
Total Phosphorus	(000665)	()	mg/l	_____	_____
Oil and Grease(1)	(000550)	()	mg/l	_____	_____
Oil and Grease(2)	(000550)	()	mg/l	_____	_____
Chlorides	(099016)	()	mg/l	_____	_____
Phenol	(032730)	()	mg/l	_____	_____
Total Chromium	(001034)	()	mg/l	_____	_____
Hex. Chromium	(001032)	()	mg/l	_____	_____
Zinc	(001092)	()	mg/l	_____	_____
Copper	(001042)	()	mg/l	_____	_____
Lead	(017501)	(X)	468.0 mg/kg mg/l	EP	11/12/90
Cyanide	(000722)	()	mg/l	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____

Remarks Only lead needed per B. Stewart.

*Date of Test Initiation _____

BUREAU OF POLLUTION CONTROL
SAMPLE REQUEST FORM

Lab Bench No. 1464

I. GENERAL INFORMATION: Facility Name Delta Brick Inc. (Boral Brick)
County Code 2000 Noxubee NPDES Permit No. _____
Discharge No. _____ Date Requested 10/10/90
Sample Point Identification Ditch on west side of facility-at discharge point
Requested By Bill Stewart Data To Bill Stewart
Type of Sample: Grab (☒) Composite (Flow) (Time) Other ()

II. SAMPLE IDENTIFICATION:
Environment Condition Cool/overcast Collected By A.Harthcock
Where Taken Ditch on west side of facility - at discharge point

Type	Parameters	Preservative	Date	Time
1. Grab-soil samples	Pb	Soil Samples	10/9/90	1400
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____

III. FIELD:

Analysis	Computer Code	Request	Results	Analyst	Date
pH	(000400)	()	_____	_____	_____
D.O.	(000300)	()	_____	_____	_____
Temperature	(000010)	()	_____	_____	_____
Residual Chlorine	(050060)	()	_____	_____	_____
Flow	(074060)	()	_____	_____	_____

IV. TRANSPORTATION OF SAMPLE: Bus () RO Vehicle () Other ()

V. LABORATORY: Received By David Singleton Date 10/11/90 Time 900
Recorded By Dorothy Lewis Date Sent to State Office 11-10-90

Analysis	Computer Code	Request	Result	Analyst	Date Measured
BOD ₅	(000310)	()	mg/l	_____	*
COD ₅	(000340)	()	mg/l	_____	_____
TOC	(000680)	()	mg/l	_____	_____
Suspended Solids	(099000)	()	mg/l	_____	_____
TKN	(000625)	()	mg/l	_____	_____
Ammonia-N	(000610)	()	mg/l	_____	_____
Fecal Coliform(1)	(074055)	()	colonies/100 ml	_____	*
Fecal Coliform(2)	(074055)	()	colonies/100 ml	_____	*
Total Phosphorus	(000665)	()	mg/l	_____	_____
Oil and Grease(1)	(000550)	()	mg/l	_____	_____
Oil and Grease(2)	(000550)	()	mg/l	_____	_____
Chlorides	(099016)	()	mg/l	_____	_____
Phenol	(032730)	()	mg/l	_____	_____
Total Chromium	(001034)	()	mg/l	_____	_____
Hex. Chromium	(001032)	()	mg/l	_____	_____
Zinc	(001092)	()	mg/l	_____	_____
Copper	(001042)	()	mg/l	_____	_____
Lead	(017501)	(X)	160.0 mg/kg mg/l	EP	11/12/90
Cyanide	(000722)	()	mg/l	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____
_____	_____	()	_____	_____	_____

Remarks Only lead needed per B. Stewart

*Date of Test Initiation _____

AQUIFER CODE EXPLANATION

112MRVA	Mississippi River alluvial aquifer
121CRNL	Citronelle Formation
121GRMF	Graham Ferry Formation
122MOCN	Miocene Series, undifferentiated
122PCGL	Pascagoula Formation
122HBRG	Hattiesburg Formation
122CTHL	Catahoula Formation
122CTHLU	Catahoula Formation, Upper
122CTHLM	Catahoula Formation, Middle
122CTHLL	Catahoula Formation, Lower
123WSBR	Waynesboro Sand
123VKBG	Vicksburg Group
123FRHL	Forest Hill Sand
124CCKF	Cockfield Formation
124SPRT	Sparta Sand
124TLLT	Tallahatta Formation
124MUWX	Meridian-Upper Wilcox aquifer
124TSCM	Tusahoma Formation
124WLCXM	Middle Wilcox aquifer
124WLCXL	Lower Wilcox aquifer
211RPLY	Ripley Formation
211COFF	Coffee Sand
211EUTW	Eutaw Formation
211MCSN	McShan Formation
211GORD	Gordo Formation
211MSSV	Massive Sand
300PLZC	Paleozoic rocks

A - Air conditioning	I - Irrigation	R - Recreation
B - Bottling	J - Industrial (cooling)	S - Stock
C - Commercial	K - Mining	T - Institutional
D - Dewater	M - Medicinal	U - Unused
E - Power	N - Industrial	Y - Desalination
F - Fire	P - Public supply	Z - Other (explain in remarks)
H - Domestic	Q - Aquaculture	

.25 mile radius
Delta Brick Site
Noxubee Co

- 0 - Sites Selected

Reference 5

.50 mile radius
Delta Brick Site
Noxuke Co.

-0- Sites selected

DATE: 02/21/97

WATER WELLS WITHIN 1.0 MI RADIUS OF DELTA BRICK SITE NOXUBEE CO MS.

PAGE 1a

LOCAL WELL NUMBER	LAND- NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)
H020 MACON	SWSWS33T15NR17E	330615	0883415	U	1309	--	--	20.00
N002 A W COTTON	SWSES06T14NR17E	330520	883501	H	934	--	--	--

EUTW

AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	ALTITUDE OF LAND SURFACE (FEET)	DATA RELI- ABILITY
211EUTW	10.00	08-01-54	175.00	C
211EUTW	--	--	245.00	C

DATE: 02/21/97

WATER WELLS WITHIN 2.0 MI RADIUS OF DELTA BRICK SITE NOXUBEE CO MS.

PAGE 1a

LOCAL WELL NUMBER	LAND- NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)
✓ H013 MACON	----S33T15NR17E	330658	0883405	U	800	--	--	--
✓ H015 MACON	SENE33T15NR17E	330640	883329	U	1820	1760.00	--	556.00
✓ H016 MACON	SWSWS27T15NR17E	330642	0883325	U	1815	1755.00	1815.00	497.00
✓ H017 MACON MILK CO	NWNES33T15NR17E	330655	883411	U	850	--	--	--
✓ H018 BORDEN CO	NWNWS32T15NR17E	330654	0883410	U	1308	1172.00	--	300.00
✓ H019 GM & O RAILROAD	----S33T15NR17E	330642	0883420	--	800	--	--	--
H020 MACON	SWSWS33T15NR17E	330615	0883415	U	1309	--	--	20.00
✓ H023 JEFF LANIER	SESWS34T15NR17E	330617	883240	H	1033	--	--	5.00
✓ H024 IMP COTTON OIL	SWSWS28T15NR17E	330707	883419	U	1312	1252.00	--	45.00
✓ H025 IMP COTTON OIL	SWSWS28T15NR17E	330706	883420	U	1300	--	--	20.00
✓ H032 BILLY LANIER	SWNES34T15NR17E	330631	883253	H	945	21.00	--	--
✓ H038 MACON	NENWS33T15NR17E	330655	0883349	P	1857	1777.00	--	1200.00
✓ H115 MACON	NWNWS33T15NR17E	330701	0883412	P	1807	1767.00	--	942.00
N002 A W COTTON	SWSES06T14NR17E	330520	883501	H	934	--	--	--
✓ N019 JON MILLER	----S06T14NR17E	330528	883620	H	1110	722.00	--	--
✓ N020 GRADY HUNTER	----S10T14NR17E	330456	883250	H	976	--	--	--
✓ N024 LEIR HAILEY	SWSES16T14NR17E	330417	883347	H	873	21.00	--	10.00
✓ N025 DAN BORNTAGER	NENWS16T14NR17E	330417	883348	H	900	320.00	--	--
✓ N026 GERMAN BROWN	NESWS10T14NR17E	330457	883243	H	920	800.00	--	7.00
✓ N027 GORDAN DAVIS	NWSES10T14NR17E	330458	883259	H	980	860.00	--	7.00
✓ N030 GERMAN BROWN	----S03T14NR17E	330539	0883300	H	860	120.00	--	7.00

MSSV

MSSV

MSSV

AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	ALTITUDE OF LAND SURFACE (FEET)	DATA RELI- ABILITY
211EUTW	14.00	01-01-19	201.00	U
211MSSV	43.00	10-02-78	235.00	C
211MSSV	31.00	10-02-78	225.00	C
211EUTW	--	--	--	C
211GORD	13.00	06-01-70	185.00	C
211EUTW	--	--	175.00	U
211EUTW	10.00	08-01-54	175.00	C
211EUTW	64.00	03-01-53	--	C
211GORD	--	--	--	C
211GORD	2.00	10-01-55	--	C
211EUTW	56.00	01-01-62	--	C
211MSSV	31.00	10-02-78	215.00	C
211MSSV	9.37	12-02-82	185.00	C
211EUTW	--	--	245.00	C
211EUTW	48.00	05-01-62	--	U
211EUTW	36.00	05-01-65	--	U
211EUTW	31.57	12-02-82	180.00	C
211EUTW	40.00	07-01-72	--	C
211EUTW	40.00	01-01-74	--	C
211EUTW	40.00	10-01-73	--	C
211EUTW	40.00	01-01-74	--	U

DATE: 02/21/97

WATER WELLS WITHIN 3.0 MI RADIUS OF DELTA BRICK SITE NOXUBEE CO MS.

PAGE 1a

LOCAL WELL NUMBER	LAND- NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)
✓ H006 FRANK CADE	SESWS21T15NR17E	330758	883327	H	900	--	--	3.00
✓ H007 STATE LIME PLANT	SESWS21T15NR17E	330759	0883411	H	850	800.00	850.00	3.00
✓ H011 EDWARD BECK	SENES27T15NR17E	330719	883223	H	957	22.00	--	--
✓ H012 RUTH GRISOM	SESWS27T15NR17E	330709	883310	H	949	--	--	--
✓ H013 MACON	SESWS27T15NR17E	330658	0883405	U	800	--	--	--
✓ H014 J B ELKINS	SWNES29T15NR17E	330719	883307	H	504	--	--	3.00
✓ H015 MACON	SENES33T15NR17E	330640	883329	U	1820	1760.00	--	556.00
✓ H016 MACON	SWWS27T15NR17E	330642	0883325	(P)	1815	1755.00	1815.00	497.00
✓ H017 MACON-MEEK CO	WNWS33T15NR17E	330655	883411	U	850	--	--	--
✓ H018 BORDEN CO	NWWS32T15NR17E	330654	0883410	U	1308	1172.00	--	300.00
✓ H019 CM & O RAILROAD	SS3T15NR17E	330642	0883420	--	800	--	--	--
✓ H020 MACON	SWWS33T15NR17E	330615	0883415	U	1309	--	--	20.00
✓ H023 JEFF-LANIER	SWWS34T15NR17E	330617	883240	H	1033	--	--	5.00
✓ H024 IMP-COTTON OIL	SWWS28T15NR17E	330707	883419	U	1312	1252.00	--	45.00
✓ H025 IMP-COTTON OIL	SWWS28T15NR17E	330706	883420	U	1300	--	--	20.00
✓ H030 PINEY WOODS W A	SWNES29T15NR17E	330725	0883443	(P)	1785	1745.00	--	80.00
✓ H032 BILLY LANIER	SWNES34T15NR17E	330631	883253	H	945	21.00	--	203.
✓ H036 DR PAT GILL	NWWS27T15NR17E	330739	883321	H	993	21.00	--	--
✓ H038 MACON	NWWS33T15NR17E	330655	0883349	(P)	1857	1777.00	--	1200.00
✓ H040 E VANDEVENDER	SS20T15NR17E	330811	883450	H	1110	30.00	--	6.00
✓ H042 ANNIE BANKHEAD	SENES34T15NR17E	330622	883224	H	760	231.00	--	15.00
✓ H047 JAMES BRITT	SWWS15T15NR17E	330750	883318	H	885	140.00	--	5.00
✓ H115 MACON	NWWS33T15NR17E	330701	0883412	(P)	1807	1767.00	--	942.00
✓ M001 MRS J C VAUGHN	SENES01T14NR16E	330531	883634	H	1137	21.00	--	5.00
✓ M006 A W COTTON	NWWS12T14NR16E	330507	883703	S	1160	--	--	3.00
✓ M014 W T HIGHTOWER	SS12T14NR16E	330438	883641	H	953	33.00	--	--
✓ M002 A W COTTON	SWSES06T14NR17E	330520	883501	H	934	--	--	--
✓ N003 PETE REEVES	NESES03T14NR17E	330545	883224	H	986	20.00	--	--
✓ N005 JOHN BUTLER	SWSES16T14NR17E	330337	883359	H	752	--	--	.18
✓ N006 R L ANDERSON	NESES21T14NR17E	330325	883327	H	--	--	--	3.00
✓ N008 A L LINDLEY	SSWS07T14NR17E	330430	0883620	H	994	21.00	--	--
✓ N016 WILL LINDLEY	SS12T14NR17E	330311	883341	H	1071	--	--	--
✓ N017 JODIE RUSSELL	SS17T14NR17E	330342	883431	H	850	21.00	--	--
✓ N019 JON MITLER	SS06T14NR17E	330528	883620	H	1110	722.00	--	--
✓ N020 GRADY HUNTER	SS10T14NR17E	330456	883250	H	976	--	--	--
✓ N024 LIR HALEY	SWSES16T14NR17E	330417	883347	H	873	21.00	--	10.00
✓ N025 DAN BORNTRAGER	NWWS16T14NR17E	330417	883348	H	900	320.00	--	--
✓ N026 GERMAN BROWN	NESES10T14NR17E	330457	883243	H	920	800.00	--	7.00
✓ N027 GORDAN DAVIS	NWSES10T14NR17E	330458	883259	H	980	860.00	--	7.00

AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	ALTITUDE OF LAND SURFACE (FEET)	DATA RELI- ABILITY
211EUTW	54.00	11-02-78	215.00	C
211EUTW	10.00	01-01-56	210.00	C
211EUTW	55.00	05-01-54	215.00	C
211EUTW	45.00	08-01-54	220.00	C
211EUTW	14.00	01-01-19	201.00	U
211EUTW	7.00	01-01-55	210.00	C
211MSSV	43.00	10-02-78	235.00	C
211MSSV	31.00	10-02-78	225.00	C
211EUTW	--	--	--	C
211GORD	13.00	06-01-70	185.00	C
211EUTW	--	--	175.00	U
211EUTW	10.00	08-01-54	175.00	C
211EUTW	64.00	03-01-53	--	C
211GORD	--	--	--	C
211GORD	2.00	10-01-55	--	C
211MSSV	30.	06-10-84	210.00	C
--	--	--	--	--
211EUTW	56.00	01-01-62	--	C
211EUTW	63.00	04-01-60	--	C
211MSSV	31.00	10-02-78	215.00	C
211EUTW	62.00	10-01-69	--	U
211EUTWR	80.00	03-01-69	--	C
211EUTW	70.00	12-01-74	--	U
211MSSV	9.37	12-02-82	185.00	C
211EUTW	38.00	04-01-54	230.00	C
211EUTW	--	--	220.00	C
211EUTWR	65.00	10-01-63	--	U
211EUTW	--	--	245.00	C
211MCSN	24.00	04-01-53	220.00	C
211EUTWR	2.00	09-01-41	170.00	C
211EUTW	7.00	09-01-41	160.00	C
211EUTW	30.00	06-01-59	220.00	C
211EUTW	--	--	--	U
211EUTWR	14.00	05-01-66	--	U
211EUTW	48.00	05-01-62	--	U
211EUTW	36.00	05-01-65	--	U
211EUTW	31.57	12-02-82	180.00	C
211EUTW	40.00	07-01-72	--	C
211EUTW	40.00	01-01-74	--	C
211EUTW	40.00	10-01-73	--	C

DATE: 02/21/97

WATER WELLS WITHIN 3.0 MI RADIUS OF DELTA BRICK SITE NOXUBEE CO MS.

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LOCAL WELL NUMBER	LAND- NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)
✓ N028 W WILLIAMS	SENE10T14NR17E	330442	883226	H	207	900.00	--	7.00
✓ N029 LARRY WATKINS	NESWS11T14NR17E	330500	883140	H	964	24.00	--	10.00
N030 GERMAN BROWN	S03T14NR17E	330539	0883300	H	860	120.00	--	7.00
✓ N031 HARDY STENNIS	S17T14NR17E	330345	0883422	H	1110	1030	1110	8

AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	ALTITUDE OF LAND SURFACE (FEET)	DATA RELI- ABILITY
211EUTW	40.00	11-01-73	--	C
211EUTW	68.00	09-01-73	--	C
211EUTW	40.00	01-01-74	--	U
211EUTW	76	10-16-91	190	U

LOCAL WELL NUMBER	LAND- NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)	
✓ H004 PENICK FOREST PROD	SESWS16T15NR17E	330853	883342	H	1000	21.00	--	--	EUTW
✓ H005 MINOR AMES	NWSWS22T15NR17E	330831	883315	H	945	--	--	12.00	"
2.0-3.0 H006 FRANK CADE	SESWS21T15NR17E	330758	883327	H	900	--	--	3.00	EUTW
2.0-3.0 H007 STATE LIME PLANT	SESWS21T15NR17E	330759	0883411	H	850	800.00	850.00	3.00	EUTW
✓ H008 MRS O M DANIELS	SWSWS19T15NR17E	330758	883628	H	3.0	--	--	--	"
✓ H010 AARON STEWART	SWSES25T15NR17E	330709	883100	H	847	20.00	--	--	"
2.0-3.0 H011 EDWARD BECK	SENESES27T15NR17E	330719	883223	H	957	22.00	--	--	"
2.0-3.0 H012 RUTH GRISSOM	SESWS27T15NR17E	330709	883310	H	949	--	--	--	"
1.0-2.0 H013 MACON	---S33T15NR17E	330658	0883405	U	800	--	--	--	"
2.0-3.0 H014 J B ELKINS	SWNES29T15NR17E	330719	883507	H	504	--	--	3.00	"
1.0-2.0 H015 MACON	SENESES33T15NR17E	330640	883329	U	1820	1760.00	--	556.00	--
1.0-2.0 H016 MACON	SWSWS27T15NR17E	330642	0883325	(P)	1815	1755.00	1815.00	497.00	MSSV
1.0-2.0 H017 MACON MILK CO	NWNES33T15NR17E	330655	883411	U	850	--	--	--	--
1.0-2.0 H018 BORDEN CO	NWNWS32T15NR17E	330654	0883410	U	1308	1172.00	--	300.00	--
1.0-2.0 H019 GM & O RAILROAD	---S33T15NR17E	330642	0883420	U	800	--	--	--	--
1.0-1.0 H020 MACON	SWSWS33T15NR17E	330615	0883415	U	1309	--	--	20.00	--
1.0-2.0 H023 JEFF LANIER	SESWS34T15NR17E	330617	883240	H	1033	--	--	5.00	EUTW
1.0-2.0 H024 IMP COTTON OIL	SWSWS28T15NR17E	330707	883419	U	1312	1252.00	--	45.00	--
1.0-2.0 H025 IMP COTTON OIL	SWSWS28T15NR17E	330706	883420	U	1300	--	--	20.00	--
2.0-3.0 H030 PINEY WOODS W A	SWNES29T15NR17E	330725	0883443	(P)	1785	1745.00	--	80.00	MSSV
								203.	
✓ H031 WYLLEL WOODS	NWSWS20T15NR17E	330842	883502	S	980	21.00	--	--	--
1.0-2.0 H032 BILLY LANIER	SWNES34T15NR17E	330631	883253	H	945	21.00	--	--	EUTW
✓ H034 MELVIN TONIES	SWSWS22T15NR17E	330808	883311	H	890	21.00	--	--	EUTW
✓ H035 TOM HIBLER	NESWS26T15NR17E	330726	883139	H	740	21.00	--	7.00	EUTW
2.0-3.0 H036 DR PAT GILL	NWSWS27T15NR17E	330739	883321	H	993	21.00	--	--	EUTW
✓ H037 PAT GILL	---SES22T15NR17E	330809	883239	H	--	--	--	--	--
1.0-2.0 H038 MACON	NENWS33T15NR17E	330655	0883349	(P)	1857	1777.00	--	1200.00	MSSV
2.0-3.0 H040 E VANDEVENDER	---S20T15NR17E	330811	883450	H	1110	30.00	--	6.00	EUTW
✓ H041 BOB WILLIAMS	SENESES26T15NR17E	330723	0883123	H	716	632.00	--	10.00	MSSV
2.0-3.0 H042 ANNIE BANKHEAD	SENESES34T15NR17E	330622	883224	H	760	231.00	--	15.00	EUTW
2.0-3.0 H047 JAMES BRITT	SWSWS15T15NR17E	330750	883318	H	885	140.00	--	5.00	EUTW
✓ H048 NE MISS MED CTR	NENWS21T15NR17E	330838	883350	H	935	855.00	--	15.00	"
✓ H049 AARON STEWART	NESES21T15NR17E	330832	883325	H	945	865.00	--	10.00	"
✓ H060 GREG COLE	SWS21T15NR17E	330818	0883354	H	810	730	810	16	"
1.0-2.0 H115 MACON	NWNWS33T15NR17E	330701	0883412	(P)	1807	1767.00	--	942.00	MSSV
2.0-3.0 M001 MRS J C VAUGHN	SENESES01T14NR16E	330531	883634	H	1137	21.00	--	5.00	EUTW
✓ M002 T F YOUNG	NENWS02T14NR16E	330559	883747	H	65.0	21.00	--	5.00	EUTW
2.0-3.0 M006 A W COTTON	NWNES12T14NR16E	330507	883703	S	1160	--	--	3.00	EUTW
✓ M007 MRS JIM COTTON	NENES11T14NR16E	330508	883732	H	1150	--	--	--	EUTW

AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	ALTITUDE OF LAND SURFACE (FEET)	DATA RELI- ABILITY
211EUTW	--	--	232.00	C
211EUTW	--	--	230.00	C
211EUTW	54.00	11-02-78	215.00	C
211EUTW	10.00	01-01-56	210.00	C
211EUTW	--	--	--	C
211EUTW	9.00	04-01-54	180.00	C
211EUTW	55.00	05-01-54	215.00	C
211EUTW	45.00	08-01-54	220.00	C
211EUTW	14.00	01-01-19	201.00	U
211EUTW	7.00	01-01-55	210.00	C
211MSSV	43.00	10-02-78	235.00	C
211MSSV	31.00	10-02-78	225.00	C
211EUTW	--	--	--	C
211GORD	13.00	06-01-70	185.00	C
211EUTW	--	--	175.00	U
211EUTW	10.00	08-01-54	175.00	C
211EUTW	64.00	03-01-53	--	C
211GORD	--	--	--	C
211GORD	2.00	10-01-55	--	C
211MSSV	30.	06-10-84	210.00	C
--	--	--	--	--
211EUTW	35.00	04-01-60	--	C
211EUTW	56.00	01-01-62	--	C
211EUTW	72.00	11-01-63	--	C
211EUTWR	60.00	03-01-67	--	C
211EUTW	63.00	04-01-60	--	C
--	--	--	239.00	U
211MSSV	31.00	10-02-78	215.00	C
211EUTW	62.00	10-01-69	--	U
211MCSN	60.00	11-01-69	--	C
211EUTWR	80.00	03-01-69	--	C
211EUTW	70.00	12-01-74	--	U
211EUTW	70.00	01-01-75	--	U
211EUTW	90.00	01-01-75	--	U
211EUTW	60	12-01-90	212	U
211MSSV	9.37	12-02-82	185.00	C
211EUTW	38.00	04-01-54	230.00	C
211EUTWR	60.00	01-01-56	245.00	C
211EUTW	--	--	220.00	C
211EUTW	--	--	220.00	C

LOCAL WELL NUMBER	LAND- NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)
✓ M011 J R HILLIARD	NESWS24T14NR16E	330308	883643	S	820	--	--	3.00 EUTW
2.0-3.0 M014 W T HIGHTOWER	----S12T14NR16E	330438	883641	H	953	33.00	--	-- EUTW
1.5-1.0 N002 A W COTTON	SWSES06T14NR17E	330520	883501	H	934	--	--	-- EUTW
2.0-3.0 N003 PETE REEVES	NESES03T14NR17E	330545	883224	H	986	20.00	--	-- MCSN
2.0-3.0 N005 JOHN BUTLER	SWSES16T14NR17E	330337	883359	H	752	--	--	.18 EUTW
2.0-3.0 N006 R L ANDERSON	NENES21T14NR17E	330325	883327	H	--	--	--	3.00 EUTW
✓ N007 J N COTTON	SWSES21T14NR17E	330243	883402	H	653	--	--	15.00 "
2.0-3.0 N008 A L LINDLEY	--SWS07T14NR17E	330430	0883620	H	994	21.00	--	-- "
✓ N010 H H STUART	SWWS18T14NR17E	330333	883620	U	900	--	--	3.00 EUTW
✓ N011 H H STUART	SWWS18T14NR17E	330332	883620	H	1150	19.00	--	3.00 EUTW
✓ N012 J R HILLIARD	SENWS19T14NR17E	330250	883542	S	1375	21.00	--	-- GPA
✓ N013 J R HILLIARD	SESES20T14NR17E	330242	883439	S	1100	--	--	-- EUTW
✓ N014 W A CONNER	NWNES01T14NR17E	330601	883058	H	600	--	--	-- EUTW
2.0-3.0 N016 WILL LINDLEY	----S21T14NR17E	330311	883341	H	1071	--	--	-- EUTW
2.0-3.0 N017 JODIE RUSSELL	----S17T14NR17E	330342	883431	H	850	21.00	--	-- EUTW
✓ N018 MURDIX ALLEN	----S23T14NR17E	330316	883149	H	760	31.00	--	6.00 EUTW
1.0-2.0 N019 JON MILLER	----S06T14NR17E	330528	883620	H	1110	722.00	--	-- EUTW
1.0-2.0 N020 GRADY HUNTER	----S10T14NR17E	330456	883250	H	976	--	--	-- "
✓ N022 HARRY POAG	NWNES12T14NR17E	330505	883057	S	857	777.00	--	12.00 "
1.0-2.0 N024 LEIR HAILEY	SWSES16T14NR17E	330417	883347	H	873	21.00	--	10.00 "
1.0-2.0 N025 DAN BORNTAGER	NENWS16T14NR17E	330417	883348	H	900	320.00	--	-- "
1.0-2.0 N026 GERMAN BROWN	NESWS10T14NR17E	330457	883243	H	920	800.00	--	7.00 "
1.0-2.0 N027 GORDAN DAVIS	NWSES10T14NR17E	330458	883259	H	980	860.00	--	7.00 "
2.0-3.0 N028 W WILLIAMS	SENES10T14NR17E	330442	883226	H	207	900.00	--	7.00 "
2.0-3.0 N029 LARRY WATKINS	NESWS11T14NR17E	330500	883140	H	964	24.00	--	10.00 "
1.0-2.0 N030 GERMAN BROWN	----S03T14NR17E	330539	0883300	H	860	120.00	--	7.00 "
2.0-3.0 N031 HARDY STENNIS	S17T14NR17E	330345	0883422	H	1110	1030	1110	8 "

AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	ALTITUDE OF LAND SURFACE (FEET)	DATA RELI- ABILITY
211EUTWR	20.00	01-01-38	--	C
211EUTWR	65.00	10-01-63	--	U
211EUTW	--	--	245.00	C
211MCSN	24.00	04-01-53	220.00	C
211EUTWR	2.00	09-01-41	170.00	C
211EUTW	7.00	09-01-41	160.00	C
211EUTW	13.00	01-01-45	160.00	C
211EUTW	30.00	06-01-59	220.00	C
211EUTWR	--	--	--	C
211EUTW	--	--	--	C
211GORD	--	--	180.00	C
211EUTW	--	--	--	C
211EUTWR	60.00	07-01-57	--	C
211EUTW	--	--	--	U
211EUTWR	14.00	05-01-66	--	U
211EUTWR	40.00	05-01-68	--	U
211EUTW	48.00	05-01-62	--	U
211EUTW	36.00	05-01-65	--	U
211EUTW	60.00	09-01-71	--	C
211EUTW	31.57	12-02-82	180.00	C
211EUTW	40.00	07-01-72	--	C
211EUTW	40.00	01-01-74	--	C
211EUTW	40.00	10-01-73	--	C
211EUTW	40.00	11-01-73	--	C
211EUTW	68.00	09-01-73	--	C
211EUTW	40.00	01-01-74	--	U
211EUTW	76	10-16-91	190	U

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Data Sheet Report Summary
Mississippi State Department of Health
Division of Water Supply

PWS ID Name of System Wells Connections Consecutive

Montgomery County (Cont.)

0490017	HAYS CREEK W/A-NEW LIBERTY	1	238 N
0490018	HAYS CREEK W/A-LEGION LAKE RD	0	36 Y
0490019	HAYS CREEK WATER ASSN-LODI	1	213 N

* County Code: 50

Neshoba County

0500001	CENTRAL W/A-ARLINGTON	2	324 N
0500002	CENTRAL WATER ASSOCIATION #1	2	361 N
0500003	COUNTY LINE WATER ASSOCIATION	0	132 Y
0500004	CENTRAL W/A-EAST SIDE	3	1182 N
0500005	CENTRAL W/A-HOUSE	2	968 N
0500006	KENTAWKA VALLEY WATER ASSN	1	215 N
0500007	CENTRAL W/A-NORTH PEARL RIVER	2	302 N
0500008	PHILADELPHIA UTILITIES	3	3088 N
0500009	CENTRAL WATER ASSN-SOUTHWEST	2	1149 N
0500010	CHOCTAW UTL-BOGUE CHITTO	2	169 N
0500012	CHOCTAW UTL-P R INDIAN RES	2	326 N

* County Code: 51

Newton County

0510001	BEULAH HUBBARD WATER ASSN	2	442 N
0510002	TOWN OF CHUNCKY	1	101 N
0510003	CHOCTAW UTL-CONEHATTA	2	141 N
0510004	TOWN OF DECATUR WATER DEPT.	2	442 N
0510005	DUFFEE WATER ASSOCIATION	2	440 N
0510006	TOWN OF HICKORY	1	242 N
0510007	SOUTH NEWTON RURAL W/A-LAWRENC	2	238 N
0510008	NEW IRELAND WATER ASSOCIATION	0	224 Y
0510009	CITY OF NEWTON	4	1650 N
0510010	SOUTH NEWTON RURAL W/A #1	2	255 N
0510011	TOWN OF UNION	2	850 N
0510012	NORTH DECATUR W/A #1	0	38 Y
0510013	NORTH DECATUR W/A #2-SW	0	155 Y
0510019	SOUTH NEWTON RURAL W/A #2	1	60 Y
0510020	NORTH DECATUR W/A #3-NORTH	0	55 Y
0510021	NORTH DECATUR W/A-UNION SOUTH	0	135 Y

* County Code: 52

Noxubee County

0520001	TOWN OF BROOKSVILLE	4	614 N
0520002	CEDAR CREEK WATER ASSOCIATION	0	200 Y
0520003	COLLEGE STREET WATER ASSN	0	72 Y
0520004	TOWN OF MACON	3	1064 N
0520005	MASHULAVILLE WATER ASSOCIATION	1	170 N
0520006	PINEY WOODS WATER ASSOCIATION	1	131 N
0520007	SALEM-CONCORD WATER ASSN	1	89 Y
0520008	TOWN OF SHUQUALAK	2	298 N
0520023	NORTHEAST NOXUBEE WATER ASSN	1	340 N
0520024	SHUQUALAK-BUTLER W/A	1	162 N
0520025	SOUTHEAST NOXUBEE WATER ASSN	0	85 Y

Reference 6

Table 6. Household, Family, and Group Quarters Characteristics: 1990

For definitions of terms and meanings of symbols, see text

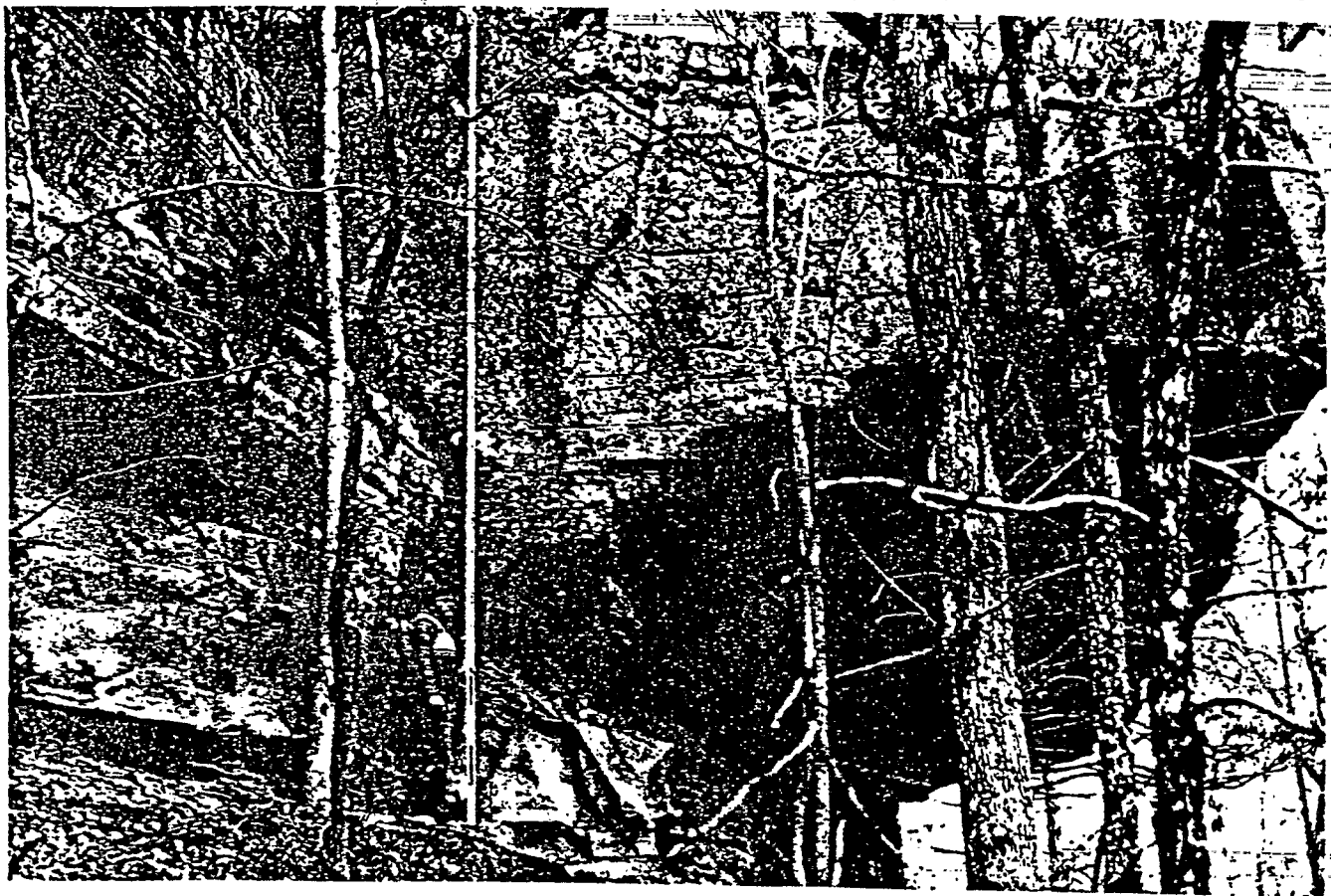
State County Place and (In Selected States) County Subdivision	Persons per --	
	Household	Family
The State	2.73	3.27
COUNTY		
Adams County	2.64	3.16
Alcorn County	2.52	3.02
Amite County	2.78	3.30
Attala County	2.83	3.20
Benton County	2.82	3.32
Bolivar County	3.02	3.64
Calhoun County	2.60	3.10
Carroll County	2.75	3.24
Chickasaw County	2.77	3.28
Choctaw County	2.76	3.26
Clatsop County	2.82	3.48
Clarke County	2.71	3.20
Clay County	2.83	3.37
Coahoma County	2.93	3.60
Copiah County	2.83	3.36
Covington County	2.84	3.35
DeSoto County	2.91	3.23
Forrest County	2.54	3.15
Franklin County	2.80	3.22
Greene County	2.86	3.28
Grimes County	2.90	3.35
Granada County	2.75	3.28
Harrison County	2.84	3.11
Hinds County	2.65	3.17
Holmes County	2.70	3.29
Humphreys County	2.97	3.61
Issaquena County	3.07	3.67
Izumi County	3.02	3.57
Jackson County	2.59	3.02
Jackson County	2.82	3.25
Jasper County	2.86	3.34
Jefferson County	3.07	3.67
Jefferson Davis County	2.91	3.43
Jones County	2.89	3.17
Kemper County	2.77	3.37
Leflore County	2.67	3.08
Leake County	2.78	3.21
Lawrence County	2.99	3.15
Lawrence County	2.74	3.28
Leake County	2.95	3.22
Lee County	2.85	3.14
LeFlore County	2.82	3.47
Lincoln County	2.86	3.20
Lauderdale County	2.71	3.20
Madison County	2.74	3.34
Marble County	2.75	3.27
Marshall County	2.93	3.41
Monroe County	2.72	3.22
Montgomery County	2.70	3.25
Neshoba County	2.77	3.22
Newton County	2.68	3.15
Norfolk County	3.04	3.65
Okfuskee County	2.58	3.18
Parola County	2.91	3.44
Pearl River County	2.77	3.21
Perry County	2.84	3.32
Pike County	2.70	3.27
Pontotoc County	2.45	3.11
Prentiss County	2.83	3.08
Quitman County	2.95	3.58
Rankin County	2.82	3.21
Scott County	2.82	3.31
Sharkey County	3.36	3.82
Simpson County	2.78	3.28
Smith County	2.78	3.25
Stone County	2.76	3.25
Sunflower County	3.06	3.71
Tallahatchie County	3.01	3.60
Tate County	2.92	3.35
Tippah County	2.68	3.14
Tishomingo County	2.46	2.93
Texas County	3.22	3.84
Union County	2.62	3.08
Waltham County	2.88	3.38
Warren County	2.72	3.28
Washington County	2.90	3.54
Wayne County	2.83	3.31
Webster County	2.83	3.17
Wilkinson County	2.85	3.38
Winston County	2.73	3.27
Yalobusha County	2.90	3.30
Yazoo County	2.86	3.45

Household
Population

U.S. Department of Commerce, Proof Copy of table generated for 1990, CPH-1: Summary population and housing characteristics, issued by Bureau of Census (April 1991). 1 page.

TISHOMINGO COUNTY GEOLOGY AND MINERAL RESOURCES

Robert K. Merrill
Delbert E. Gann
Stephen P. Jennings



BULLETIN 127

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
BUREAU OF GEOLOGY

CONRAD A. GAZZIER
Bureau Director

Jackson, Mississippi
1988

REFERENCE 8

TISHOMINGO COUNTY GEOLOGY AND MINERAL RESOURCES

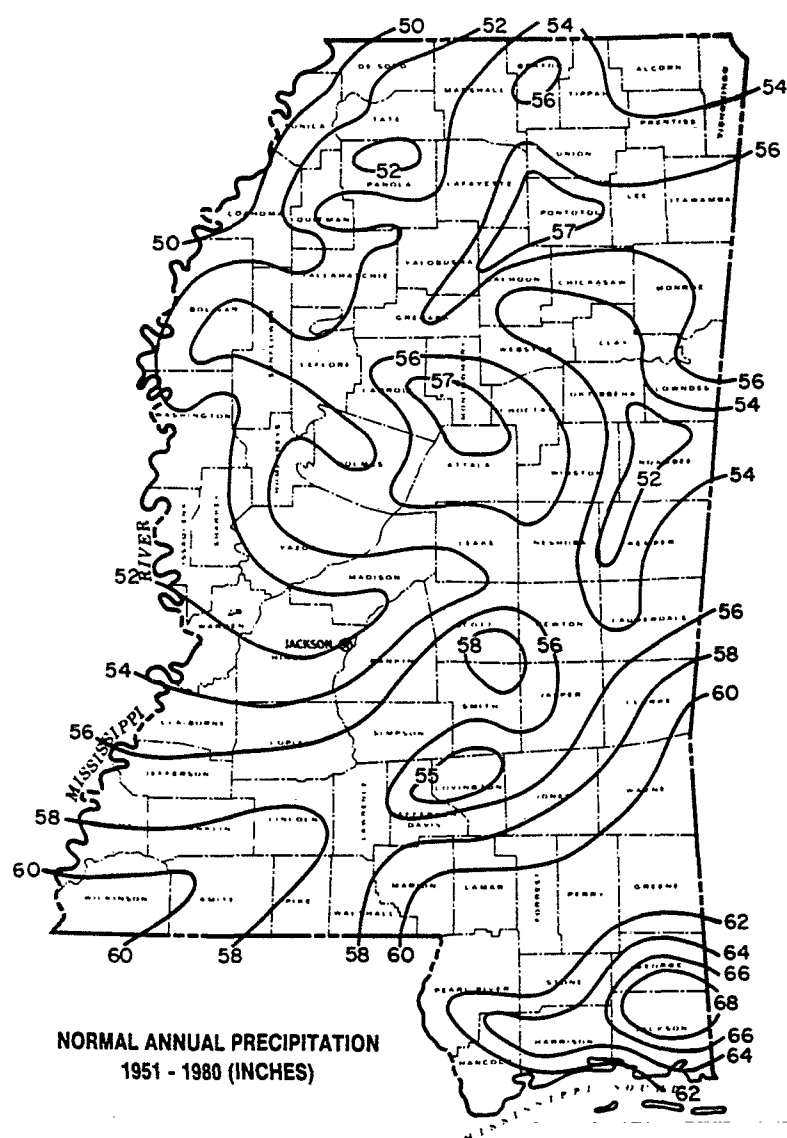


Figure 4 - Mean annual precipitation in inches. From U. S. Weather Bureau, Jackson, Mississippi. Based on the 30-year period 1951-1980. Tishomingo County is shown as the shaded area.

chert strata exposed in and around the park area waterfront areas outside the park, are shown on Plate 1) as portions of the Fort Payne Formation. Smoother hilltops are developed on softer Coastal Plain sandstones which overlie Paleozoic rocks exposed in the valley wall. This terrain comprises the southwestern limit of the Interior Low Plateaus Physiographic Province in Mississippi. Tishomingo State Park is also located along this transition zone, shown as the Paleozoic Bottoms Physiographic District in Figure 8. The geologic setting of J. P. Co. Park appears on Plate 1 (sheet 1) in the area of impounded portions of Indian Creek and the western bank of the Tennessee River, along the northeastern border of Tishomingo County. Camping facilities offered by Tishomingo State Park include 45 primitive camping packages with grills, picnic tables, and hookups for electric and running water. More luxurious accommodations include finished duplex cabins, three motel suites, a restaurant, and catering services.

Tishomingo State Park is one of the 10 or more in the State Park System. The park was constructed in the late 1930's by the Civilian Conservation Corps. The park was constructed from the beautiful sandstone of the Hartselle Formation (Highland Church Sandstone, 1930), which occurs naturally in and around the park. The park, as well as Tishomingo County and the city of Tishomingo, is named in honor of the leader of the Chickasaw Indians, Chief Tish-o-mingo. Tishomingo State Park occupies lands adjacent to Bear Creek and extends to the north and south of Horseshoe Bend. The park is located at the southernmost extent of the Interior Low Plateaus Physiographic Province (Figure 8) in Mississippi. This transition zone comprises the Paleozoic Bottom Physiographic District in Figure 8, and is locally termed the Appalachian foothills.

Tishomingo State Park contains cliff-forming sandstone of the Hartselle Formation (Highland Church Sandstone, 1930). Nearly vertical sandstone cliffs exposed in the Bear Creek valley are the result of downcutting through zones of weakness imposed by fracturing of the Paleozoic sequence. Bear Creek has eroded the entire thickness of the Hartselle sandstone, exposing thin beds of limestone comprising upper members of the Pride Mountain Formation (Plate 1). Large blocks of sandstone have broken off and moved down the





CERCLA
SECTION

SOURCES FOR WATER SUPPLIES IN MISSISSIPPI

by B. E. Wasson
Hydrologist
U.S. Geological Survey

A COOPERATIVE STUDY SPONSORED BY THE
U. S. GEOLOGICAL SURVEY
and the

Mississippi Research and Development Center

JACKSON, MISSISSIPPI

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Reference 9

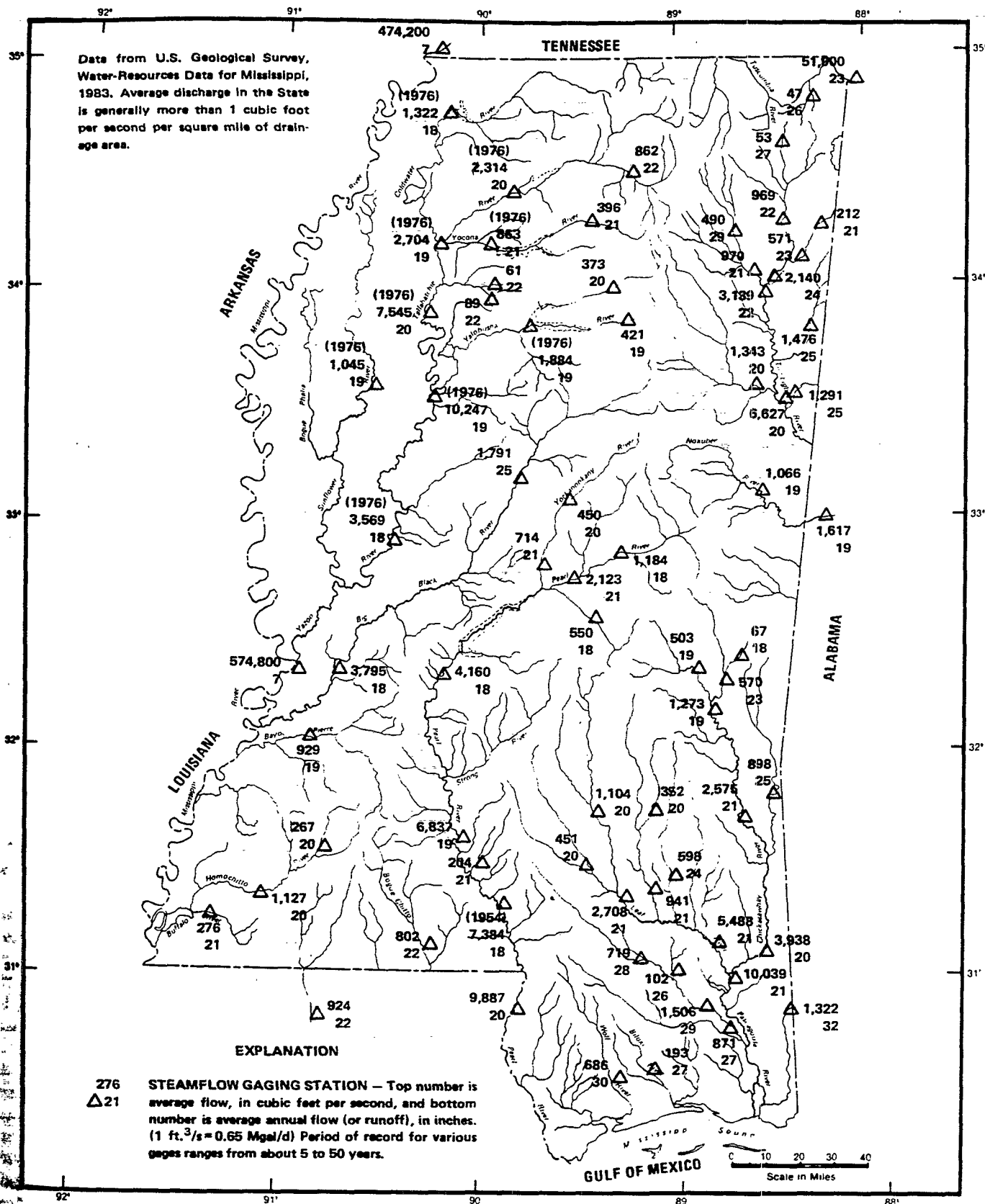


Figure 5. -- Average flow at selected streamgaging sites in cubic feet per second and in inches per year for periods of record through 1983 water year. (If end of record for station is earlier than 1983, the date is shown in parentheses.)

Eutaw-McShan Aquifer

Geologic Data

Structure: The base of the Eutaw-McShan aquifer slopes generally to the west (fig. 43). Structure contours are generalized from Boswell (1977).

Outcrop area: Generalized from Belt and others (1945) and from Speer, Golden, and Patterson (1964).

Area of freshwater occurrence: About 7,500 square miles.

Lithologic character: Fine to medium glauconitic sand interbedded with shale and clay. The upper part of the aquifer is the Tombigbee Sand Member of the Eutaw Formation, commonly a massive glauconitic sand. The sand in the lower part of the Eutaw Formation is less glauconitic and more permeable than sand in the Tombigbee Sand Member. The McShan Formation, the basal part of the Eutaw-McShan aquifer, commonly consists of many layers of sand and clay.

Thickness: In the southern part of the area the Eutaw

and McShan Formations are each about 200 feet thick and the maximum combined thickness is about 420 feet. Both formations thin to the north (Boswell, 1977).

Confining beds:

Overlying beds: South of central Lee County the Mooreville Chalk overlies and confines the Eutaw-McShan aquifer. Northward the tongue of Mooreville Chalk that separates the Eutaw-McShan aquifer from the overlying Coffee Sand aquifer becomes thinner.

Underlying bed: In the northern part of the area, the Eutaw-McShan aquifer lies on Paleozoic rocks; elsewhere the Gordo Formation underlies the Eutaw-McShan aquifer. The upper part of the Gordo Formation commonly consists of thick beds of clay that separate the Gordo aquifer from the Eutaw-McShan aquifer.

Hydrologic atlas describing aquifer: The Eutaw-McShan aquifer in Mississippi (Boswell, 1977).

Areal water-resources reports: See map showing areas covered by reports (fig. 1) and selected references.

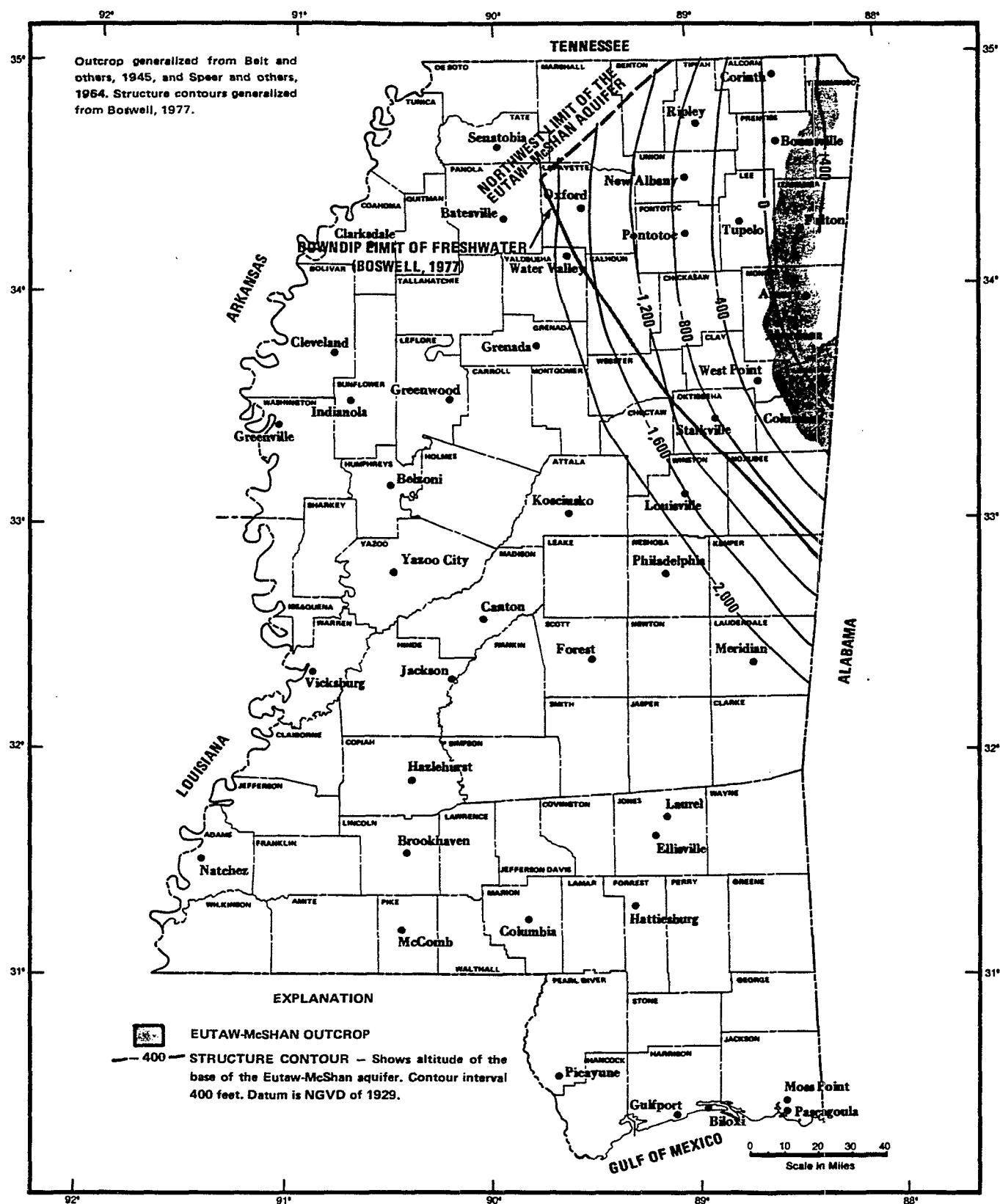


Figure 43. -- Configuration of the base of the Eutaw-McShan aquifer.

Gordo Aquifer

Geologic Data

Structure: The base of the Gordo Formation slopes generally to the southwest (fig. 46). Structure contours are generalized from Boswell (1978).

Outcrop area: Generalized from Belt and others (1945) and Speer, Golden, and Patterson (1964).

Area of freshwater occurrence: About 8,000 square miles.

Lithologic character: In much of the study area the Gordo can be subdivided into an upper clay unit and a lower sand and gravel unit (Boswell, 1978).

Thickness: Thickness of the Gordo aquifer increases from less than 50 feet in the northwestern part of the

area to about 400 feet in the southern part of the study area.

Confining beds:

Overlying bed: Beds of clay in the upper part of the Gordo Formation separate the underlying Gordo aquifer from the overlying Eutaw-McShan aquifer.

Underlying bed: Commonly a thick bed of clay occurs in the upper part of the Coker Formation that separates the Gordo aquifer from the underlying Coker aquifer.

Hydrologic atlas describing aquifer: The Tuscaloosa Aquifer System in Mississippi (Boswell, 1978).

Areal water-resources reports: See map showing areas covered by reports (fig. 1) and selected references.

Coker Aquifer

Geologic Data

Structure: The base of the Coker Formation slopes generally to the southwest (fig. 49). Structure contours are generalized from Boswell (1978).

Outcrop area: The Coker Formation does not crop out in Mississippi but does crop out to the east in Alabama.

Area of freshwater occurrence: About 4,400 square miles.

Lithologic character: The upper part of the Coker Formation is composed of clay and irregular beds of sand. The lower part of the formation is composed of clay, sand, and gravel. The Coker aquifer, as used in this report, also includes Lower Cretaceous deposits where they contain freshwater. The Lower Cretaceous deposits include thick beds of sand or sand and gravel in the southern part of the area (Boswell, 1978).

Thickness: In the extreme northern part of the area the combined units are less than 50 feet thick and increase to more than 1,500 feet in the southern part of the area. In the southern part, the Coker Formation is more than 500 feet thick and the Lower Cretaceous deposits are more than 1,000 feet thick.

Confining beds:

Overlying bed: The upper part of the Coker Formation commonly is a thick clay that tends to separate the Coker aquifer from the overlying Gordo aquifer.

Underlying bed: The Coker aquifer is underlain by Paleozoic rock and sediments of Early Cretaceous age.

Hydrologic atlas describing aquifer: The Tuscaloosa aquifer system in Mississippi (Boswell, 1978).

Areal water-resources reports: See map showing areas covered by reports (fig. 1) and selected references.

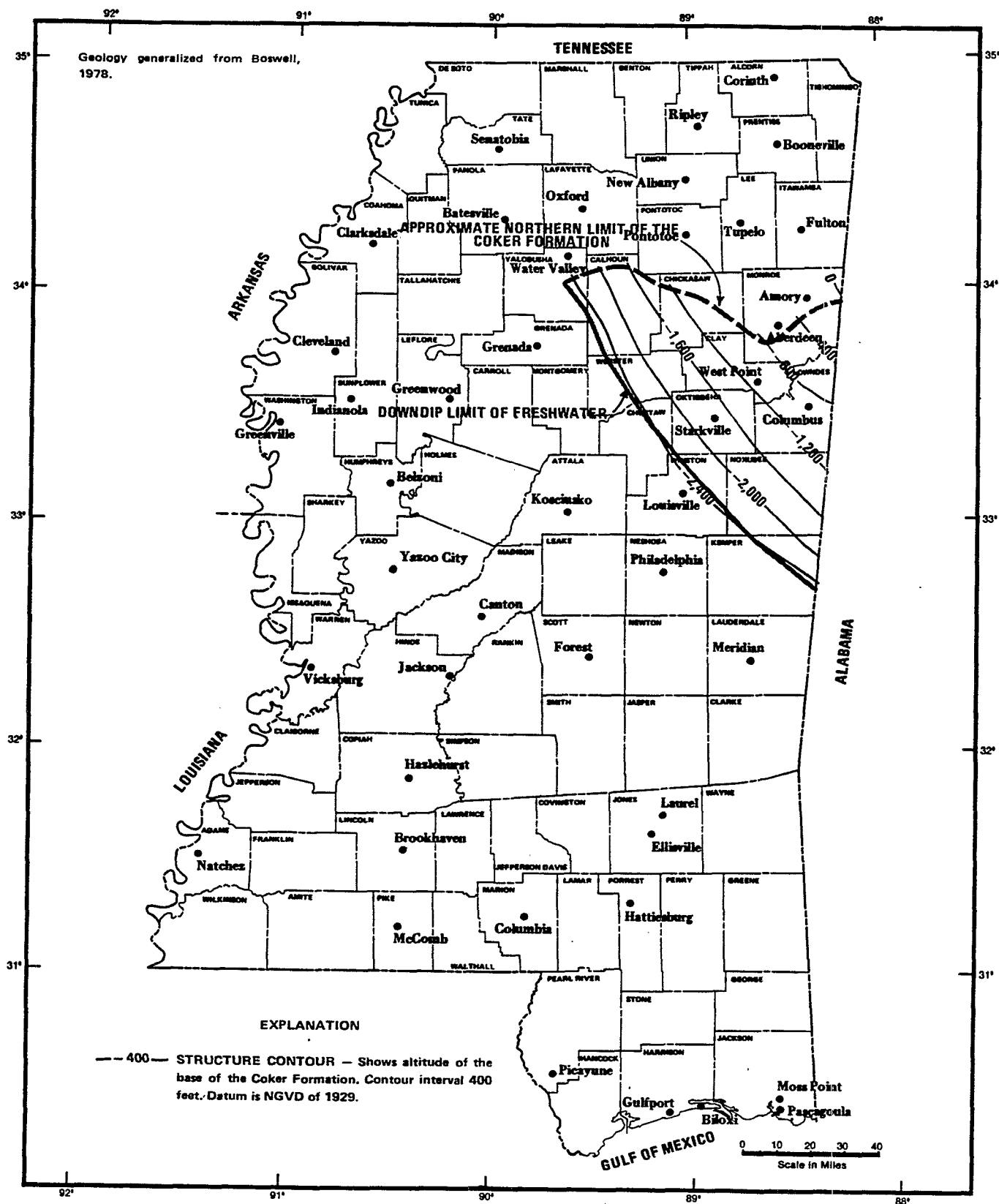
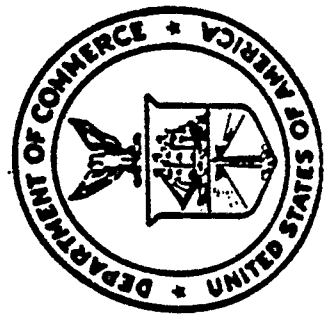


Figure 49. — Configuration of the base of the Coker Formation.

TECHNICAL PAPER NO. 40

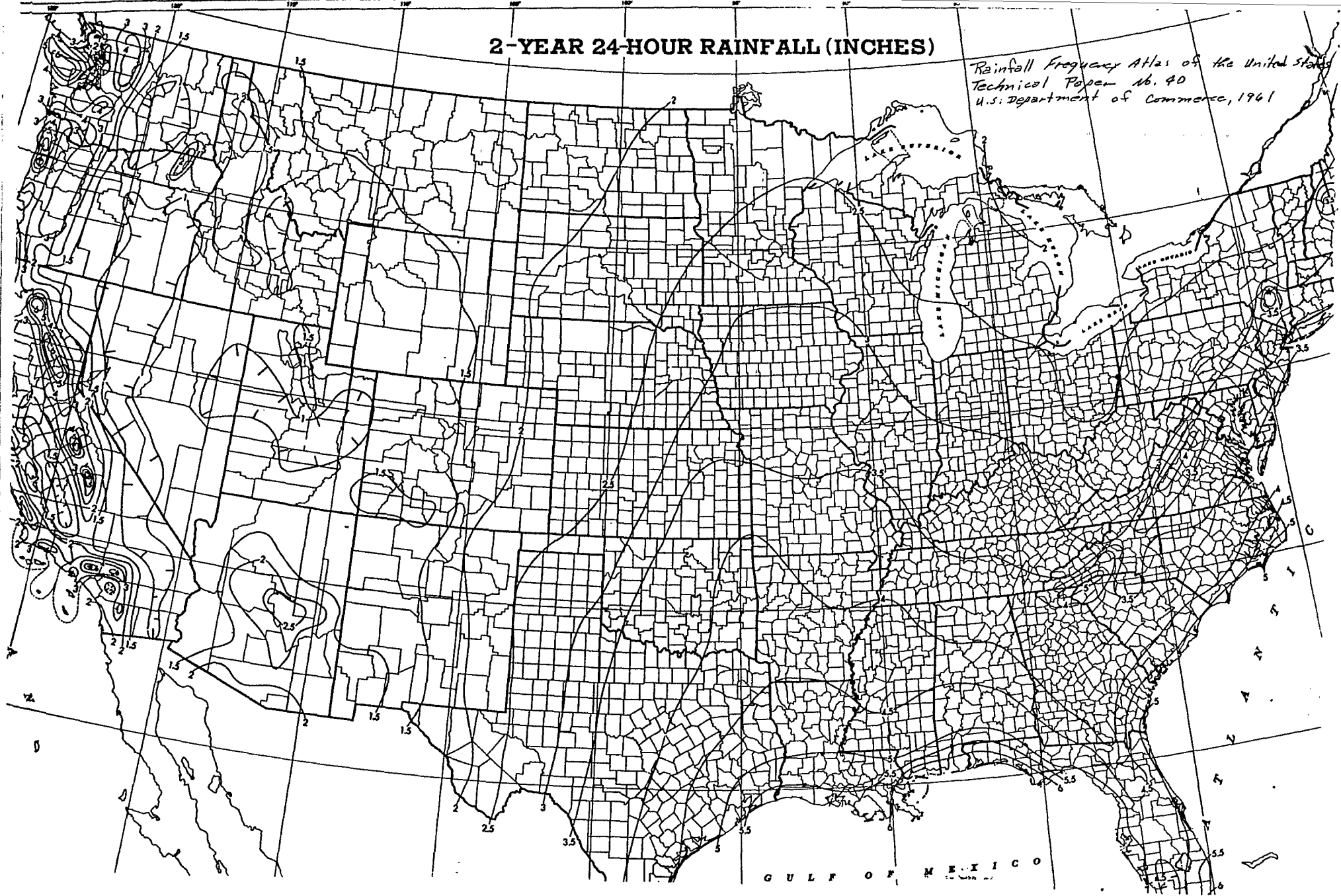
RAINFALL FREQUENCY ATLAS OF THE UNITED STATES
for Durations from 30 Minutes to 24 Hours and
Return Periods from 1 to 100 Years

Prepared by
DAVID M. HENSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture



2-YEAR 24-HOUR RAINFALL (INCHES)

Rainfall Frequency Atlas of the United States
Technical Paper No. 40
U.S. Department of Commerce, 1961



FLOOD HAZARD BOUNDARY MAP

**NOXUBEE COUNTY
MISSISSIPPI
UNINC. AREAS**

PAGE 5 OF 9

(SEE MAP INDEX FOR PAGES NOT PRINTED)

50

**EFFECTIVE DATE:
DECEMBER 23, 1977**

**COMMUNITY—PANEL NUMBER
280305 0005 A**



**U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT**
FEDERAL INSURANCE ADMINISTRATION

Reference 11

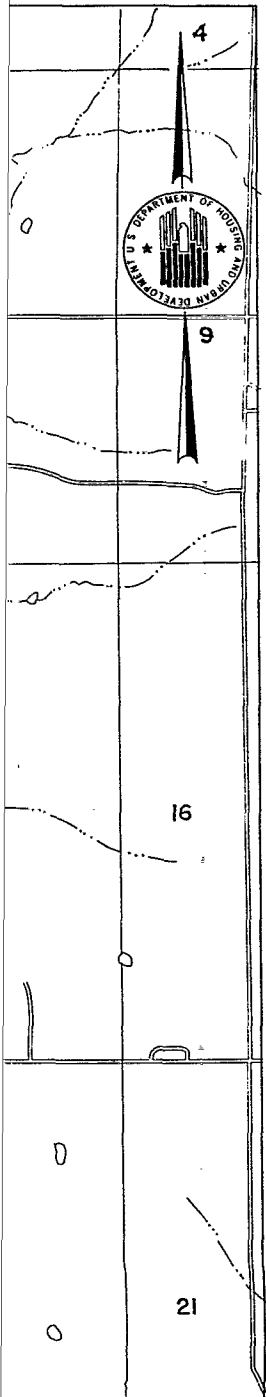
KEY TO SYMBOLS

**SPECIAL FLOOD HAZARD
AREA**

ZONE A

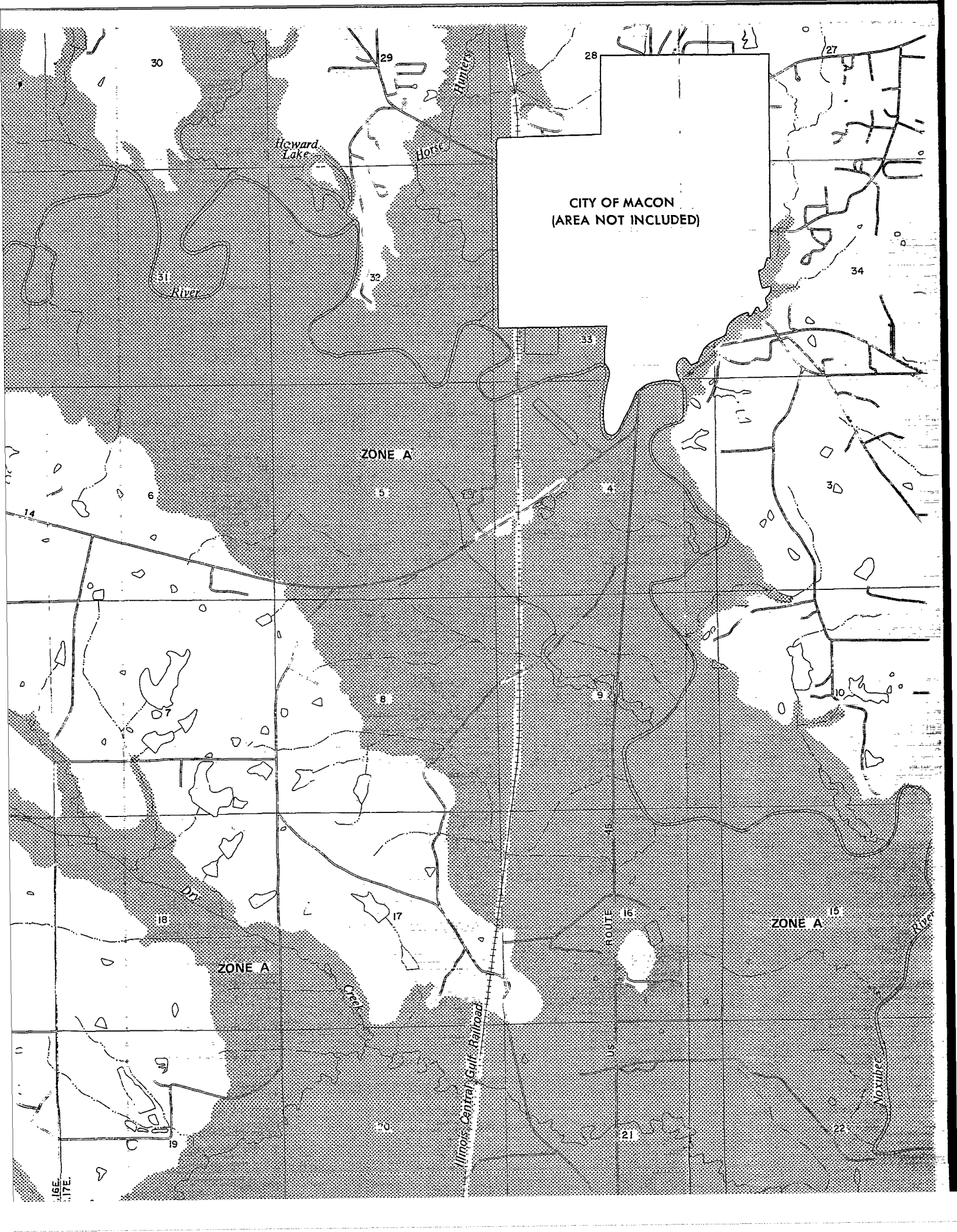
Note: These maps may not include all Special Flood Hazard Areas in the community. After a more detailed study, the Special Flood Hazard Areas shown on these maps may be modified, and other areas added.

**CONSULT NFIA SERVICING COMPANY OR LOCAL INSURANCE
AGENT OR BROKER TO DETERMINE IF PROPERTIES IN THIS
COMMUNITY ARE ELIGIBLE FOR FLOOD INSURANCE.**



APPROXIMATE SCALE IN FEET:
2000 0 2000

Copied at 75%



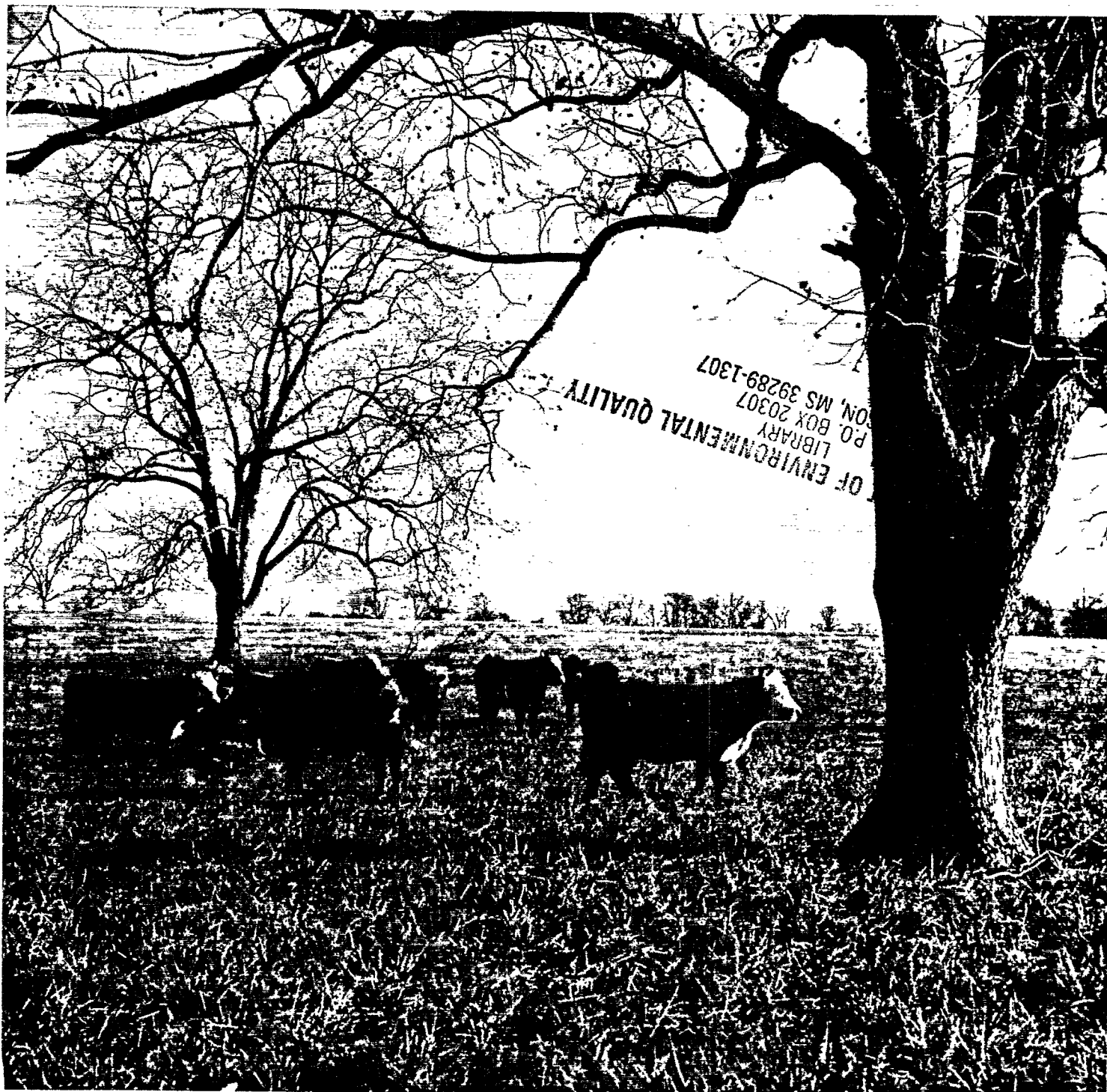


United States
Department of
Agriculture

In cooperation with
Mississippi Agricultural
and Forestry Experiment
Station

Soil
Conservation
Service

Soil Survey of Noxubee County, Mississippi



Reference 12

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Dominantly Nearly Level and Gently Sloping Soils on Flood Plains and Stream Terraces; Subject to Flooding

The soils of the three general soil map units in this group are on flood plains and terraces of large streams. The major soils are the clayey Catalpa and Leeper soils; the loamy Cahaba, Latonia, Mantachie, and Quitman soils; and the silty Urbo soils. These soils are well drained to somewhat poorly drained. Slopes range from 0 to 3 percent. This group makes up about 21 percent of the county.

1. Leeper-Catalpa

Nearly level, somewhat poorly drained and moderately well drained, clayey soils; on flood plains

The soils in this map unit are on flood plains of creeks, mainly in the eastern and central parts of the county. The landscape is nearly level and contains sloughs and depressions. Slopes range from 0 to 2 percent.

This map unit makes up about 8 percent of the county. It is about 65 percent Leeper soils, 33 percent Catalpa soils, and 2 percent soils of minor extent.

The somewhat poorly drained Leeper soils and the moderately well drained Catalpa soils are on flood plains. These soils formed in clayey alluvium.

The soils of minor extent are the moderately well drained Griffith soils. These soils are in higher areas of flood plains near the uplands.

Most of the acreage of this map unit is used for cultivated crops. Many of the frequently flooded areas, however, are in woodland.

In occasionally flooded areas, the Leeper and Catalpa soils are well suited to crops and pasture plants; in frequently flooded areas, they are poorly suited to crops. The hazard of flooding and wetness are the main limitations for crops.

The soils in this map unit are well suited to woodland.

The Leeper soils in this map unit have good potential for use as habitat for openland and woodland wildlife and fair potential for use as habitat for wetland habitat. The Catalpa soils have fair potential for use as habitat for openland and wetland wildlife and good potential for use as habitat for woodland wildlife.

These soils have severe limitations for urban use because of flooding and wetness.

2. Urbo-Mantachie-Quitman

Nearly level, somewhat poorly drained, silty and loamy soils and moderately well drained, loamy soils; on flood plains and stream terraces

The soils in this map unit are on flood plains and stream terraces that are mainly along the flood plain of the Noxubee River and its tributaries from the west. The landscape is nearly level; it has shallow drainageways, depressions, and a few old river runs and oxbow lakes. Slopes range from 0 to 2 percent.

This map unit makes up about 12 percent of the county. It is about 37 percent Urbo soils, 31 percent Mantachie soils, 11 percent Quitman soils, and 11 percent soils of minor extent.

The somewhat poorly drained Urbo soils are on flood plains on the broad flats and in depressions away from the main streams. These soils formed in clayey alluvium. The somewhat poorly drained Mantachie soils are on flood plains and generally are in the slightly higher areas and near some of the stream channels. These soils formed in loamy alluvium. The moderately well drained Quitman soils are on stream terraces. These soils formed in loamy material.

The soils of minor extent are the well drained Jena soils and the moderately well drained Mooreville soils on flood plains.

Most of the acreage of this map unit is in woodland. The rest of the acreage is used for cultivated crops.

The soils in this map unit are well suited to crops and pasture plants commonly grown in the area. The hazard of flooding and wetness are the main limitations for crops and pasture.

These soils are well suited to woodland.

The Urbo soils have fair potential for use as habitat for openland wildlife and Mantachie and Quitman soils have good potential. The soils in this map unit have good potential for use as habitat for woodland wildlife. The Urbo soils have good potential for use as habitat for wetland wildlife, Mantachie soils have fair potential, and Quitman soils have poor potential.

Flooding and wetness are severe limitations to use of the soils in this map unit for urban use.

3. Latonia-Cahaba

Nearly level and gently sloping, well drained, loamy soils; on stream terraces

The soils in this map unit are in the extreme northeastern part of Noxubee County. They are on stream terraces on the west side of the Tombigbee River. The landscape consists of nearly level wooded flats that have a few depressions and intermittent stream channels. Slopes range from 0 to 3 percent.

This map unit makes up about 1 percent of the county. It is about 40 percent Latonia soils, 30 percent Cahaba soils, and 30 percent soils of minor extent.

The Latonia soils are on stream terraces. These soils formed in sediment that is loamy in the upper part and sandy in the lower part. The Cahaba soils are on stream terraces. These soils formed in loamy material.

The soils of minor extent are the somewhat poorly drained Mantachie and Urbo soils on narrow flood plains. Also of minor extent are soils on stream terraces that are similar to Cahaba soils except they have a browner subsoil and have grayish mottles within a depth of 30 inches. Areas of floodwater from the Aliceville Lock and Dam on the Tombigbee River are also included.

Most of the acreage in this map unit is in woodland. There are a few scattered food plots for wildlife.

The Latonia and Cahaba soils in this map unit are well suited to cultivated crops and pasture plants that are commonly grown in the county.

The soils in this map unit are well suited to woodland.

These soils have good potential for use as habitat for openland and woodland wildlife and very poor potential for use as habitat for wetland wildlife.

The hazard of flooding is a severe limitation to use of these soils for urban use.

Dominantly Nearly Level to Sloping Soils on Uplands and Stream Terraces

The soils of the four general soil map units in this group are on nearly level to sloping uplands and nearly level to gently sloping stream terraces. The major soils are the loamy Freest, Prentiss, Savannah, Stough, and

Vimville soils and the silty Falkner, Longview, and Wilcox soils. These soils are moderately well drained to poorly drained. Slopes range from 0 to 8 percent. This group makes up about 22 percent of the county.

4. Stough-Freest-Vimville

Nearly level and gently sloping, somewhat poorly drained, moderately well drained, and poorly drained, loamy soils; on stream terraces and uplands

The soils in this map unit are mainly on lower-lying uplands and stream terraces. These soils are in the general area of the Noxubee River, which flows diagonally across the county from northwest to southeast. The landscape consists of nearly level flats that have depressions and a few gently sloping hillsides. Slopes range from 0 to 5 percent.

This map unit makes up about 3 percent of the county. It is about 50 percent Stough soils, 20 percent Freest soils, 15 percent Vimville soils, and 15 percent soils of minor extent.

The somewhat poorly drained Stough soils are on broad upland flats and stream terraces. These soils formed in loamy material. The moderately well drained Freest soils are on upland flats, hillsides, and stream terraces. These soils formed in sediment that is loamy in the upper part and clayey in the lower part. The poorly drained Vimville soils are on uplands and stream terraces. These soils formed in loamy material.

The soils of minor extent are Prentiss, Talla, Mantachie, and Urbo soils. The moderately well drained Prentiss soils are on uplands and stream terraces. The somewhat poorly drained Talla soils are on upland flats and stream terraces. The somewhat poorly drained Mantachie and Urbo soils are on narrow flood plains.

About 50 percent of the acreage in this map unit is used for cultivated crops or pasture. The rest of the acreage is in woodland.

The nearly level Stough and Freest soils are well suited to cultivated crops and pasture plants. Vimville soils are moderately suited to cultivated crops and well suited to pasture plants commonly grown in the area. Wetness is the main limitation for crops and pasture on Vimville soils.

The soils in this map unit are well suited to woodland.

Stough and Freest soils have good potential for use as habitat for openland and woodland wildlife. Stough soils have fair potential for use as habitat for wetland wildlife and Freest soils have poor potential. Vimville soils have fair potential for use as habitat for openland wildlife and good potential for use as habitat for woodland and wetland wildlife.

Wetness is a severe limitation to use of these soils for urban use. The Freest soils also have severe limitations for urban use because of the high shrink-swell potential of the subsoil.

during the winter and early in the spring before the growing season. The slope ranges from 0 to 2 percent.

Typically, the surface layer is dark grayish brown silty clay loam to a depth of about 5 inches. The subsoil is dark grayish brown silty clay mottled in shades of brown to a depth of about 37 inches; and below that is dark grayish brown clay mottled in shades of brown to a depth of about 70 inches or more.

This Urbo soil is very strongly acid or strongly acid throughout except in areas where the surface layer has been limed. Permeability is very slow, and the available water capacity is high. Runoff is slow. Erosion is a slight hazard. The seasonal high water table is at a depth of 1 foot to 2 feet during wet periods. The surface layer is sticky when wet, and it is hard when dry. If tilled when the soil is too wet or too dry, clods tend to form. The optimum range of moisture content for tilling this soil is narrow. The soil shrinks and cracks during dry periods.

Included with this soil in mapping are small areas of Jena, Mantachie, and Mooreville soils on flood plains. Jena soils are well drained. Mantachie soils are somewhat poorly drained. Mooreville soils are moderately well drained. Also included is a soil that is similar to Urbo soil except it has a dominantly grayish subsoil. This soil is on flood plains. Also included are a few small low-lying areas of soils that are flooded for several days during wet periods.

Most of the acreage of this Urbo soil is used for row crops or pasture. A small acreage is used as woodland.

This soil is well suited to cotton, corn, soybeans, and small grains. If this soil is used for cultivated crops, proper arrangement of plant rows and surface field ditches are needed to remove excess surface water. Returning crop residue to the soil improves soil fertility and tilth.

This soil is well suited to grasses and legumes for pasture or hay. Proper stocking, controlled grazing, and weed and brush control help keep the pasture and soil in good condition.

This soil is well suited to eastern cottonwood, loblolly pine, sweetgum, American sycamore, yellow-poplar, green ash, and cherrybark oak. Seasonal wetness and flooding are moderate limitations to use of equipment on this soil, but these limitations can be partly overcome by harvesting during the drier periods. Erosion is a slight hazard, seedling mortality is slight, and plant competition is moderate.

Flooding, seasonal wetness, and very slow permeability of the subsoil are severe limitations for urban use and for septic tank absorption fields. Low strength is a severe limitation for local roads and streets.

This Urbo soil is in capability subclass IIw and in woodland suitability group 1w8.

UM—Urbo-Mantachie association, occasionally flooded. This map unit consists of deep, somewhat poorly drained, nearly level soils on flood plains. The

soils formed in clayey alluvium and in loamy alluvium.

The landscape consists of wide, wooded flood plains that are from one-eighth of a mile to 1 mile wide. There are scattered oxbow lakes, old stream channels, sloughs, and depressions in these areas. Urbo and Mantachie soils are subject to brief periods of flooding each year, mostly in the winter and early in the spring before the growing season. The sloughs and depressions are flooded for longer periods. Some of the higher areas overflow less frequently. The soils in this map unit are in a regular and repeating pattern. Individual areas of these soils are large enough to have been mapped separately, but because of present and expected continued use, they were mapped as an association. The Urbo soil mainly is on broad flats and in depressions adjacent to the main streams. The Mantachie soil is in the slightly higher areas and generally is near the stream channels. Mapped areas range from 160 to about 1,000 acres. The slope ranges from 0 to 2 percent.

Urbo soil and soils that are similar make up about 56 percent of the map unit. Typically, the surface layer is dark grayish brown silty clay loam to a depth of about 6 inches. The upper part of the subsoil is yellowish brown silty clay mottled in shades of brown and gray to a depth of 14 inches. The middle part, to a depth of about 29 inches, is grayish brown silty clay mottled in shades of brown. The lower part of the subsoil is silty clay mottled in shades of brown and gray to a depth of 70 inches or more.

This Urbo soil is very strongly acid or strongly acid throughout. Permeability is very slow, and the available water capacity is high. Runoff is slow. Erosion is a slight hazard. The seasonal high water table is at a depth of 1 foot to 2 feet in winter and early in the spring. The surface layer is sticky when wet, and it is hard when dry. If tilled when the soil is too wet or too dry, clods tend to form. The optimum range of moisture content for tilling this soil is narrow. The soil shrinks and cracks during dry periods.

The Mantachie soil and soils that are similar make up about 25 percent of the map unit. Typically the surface layer is brown loam to a depth of about 5 inches. The subsoil is sandy clay loam mottled in shades of brown and gray to a depth of about 25 inches. Below that, it is light brownish gray clay loam that has mottles in shades of brown to a depth of 60 inches or more.

This Mantachie soil is very strongly acid or strongly acid throughout. Permeability is moderate, and the available water capacity is high. Runoff is slow. Erosion is a slight hazard. The seasonal high water table is at a depth of 1 foot to 1 1/2 feet during wet periods. The surface layer is friable and is easily tilled throughout a wide range of moisture content. The soil tends to crust and pack after heavy rains if no residue is left on the surface.

Included in mapping are Jena and Mooreville soils on flood plains of major streams. Jena soils are well drained, and Mooreville soils are moderately well drained. Also included are small areas of Cahaba, Quitman, and Stough soils on stream terraces that are in higher positions on the landscape. Cahaba soils are well drained, Quitman soils are moderately well drained, and Stough soils are somewhat poorly drained. Also included are some poorly drained, clayey soils in depressions and a few low areas of soils that are ponded for brief periods after heavy rainfall. The included soils make up about 19 percent of the map unit.

Most of the acreage in this map unit is in hardwood forests.

The soils in this map unit are well suited to cotton, corn, soybeans, and small grains. Seasonal wetness is the main limitation to use for crops. If the soils are used for cultivated crops, proper arrangement of plant rows and surface field ditches are needed to remove excess surface water. Returning crop residue to the soil improves fertility and tilth.

Urbo and Mantachie soils are well suited to grasses and legumes for hay and pasture. Proper stocking, controlled grazing, and weed and brush control help keep the pasture and soil in good condition.

The Urbo soil is well suited to loblolly pine, cherrybark oak, sweetgum, yellow-poplar, American sycamore, green ash, and eastern cottonwood (fig. 8). Seasonal wetness and flooding are moderate limitations to the use of equipment on this soil. Logging during drier periods partly overcomes these limitations. Erosion is a slight hazard, seedling mortality is slight, and plant competition is moderate. The Mantachie soil is well suited to loblolly pine, cherrybark oak, sweetgum, yellow-poplar, green ash, and eastern cottonwood. Seasonal wetness and flooding are severe limitations to use of equipment. Logging during drier periods partly overcomes these limitations. Plant competition is severe.

Flooding and seasonal wetness of the Mantachie soil are severe limitations for urban use and to use as septic tank absorption fields. Flooding, seasonal wetness, and the very slow permeability of the subsoil of the Urbo soil are severe limitations for urban use and to use as septic tank absorption fields. Low strength of the Urbo soil is a severe limitation for local roads and streets.

The Urbo and Mantachie soils are in capability subclass 1lw. The Urbo soil is in woodland suitability group 1w8, and the Mantachie soil is in woodland suitability group 1w9.

VaA—Vaiden silty clay, 0 to 2 percent slopes. This deep, somewhat poorly drained, nearly level soil is on broad flats on uplands. This soil formed in an acid, clayey material underlain by chalk.

Typically, the surface layer is brown silty clay to a depth of about 6 inches. The subsoil is yellowish brown clay mottled in shades of gray and red to a depth of

about 17 inches. Below that, it is clay mottled in shades of brown and gray to a depth of about 36 inches. The underlying material is clay mottled in shades of brown and gray to a depth of about 60 inches.

This slightly eroded soil has a few rills. In a few areas, evidence of accelerated erosion is in the surface layer but not enough to greatly modify the thickness and character of the original plow layer.

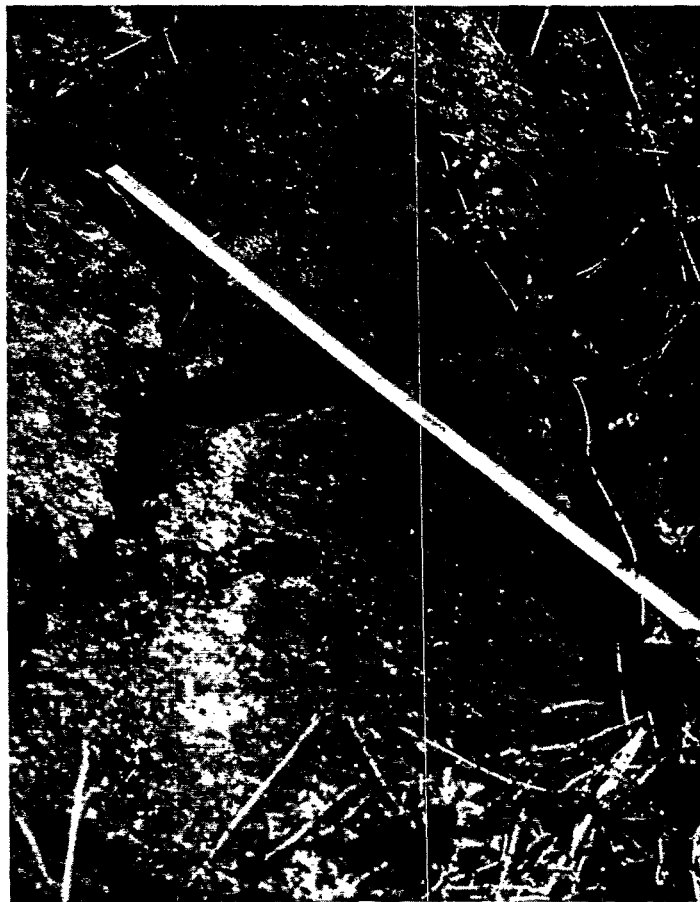
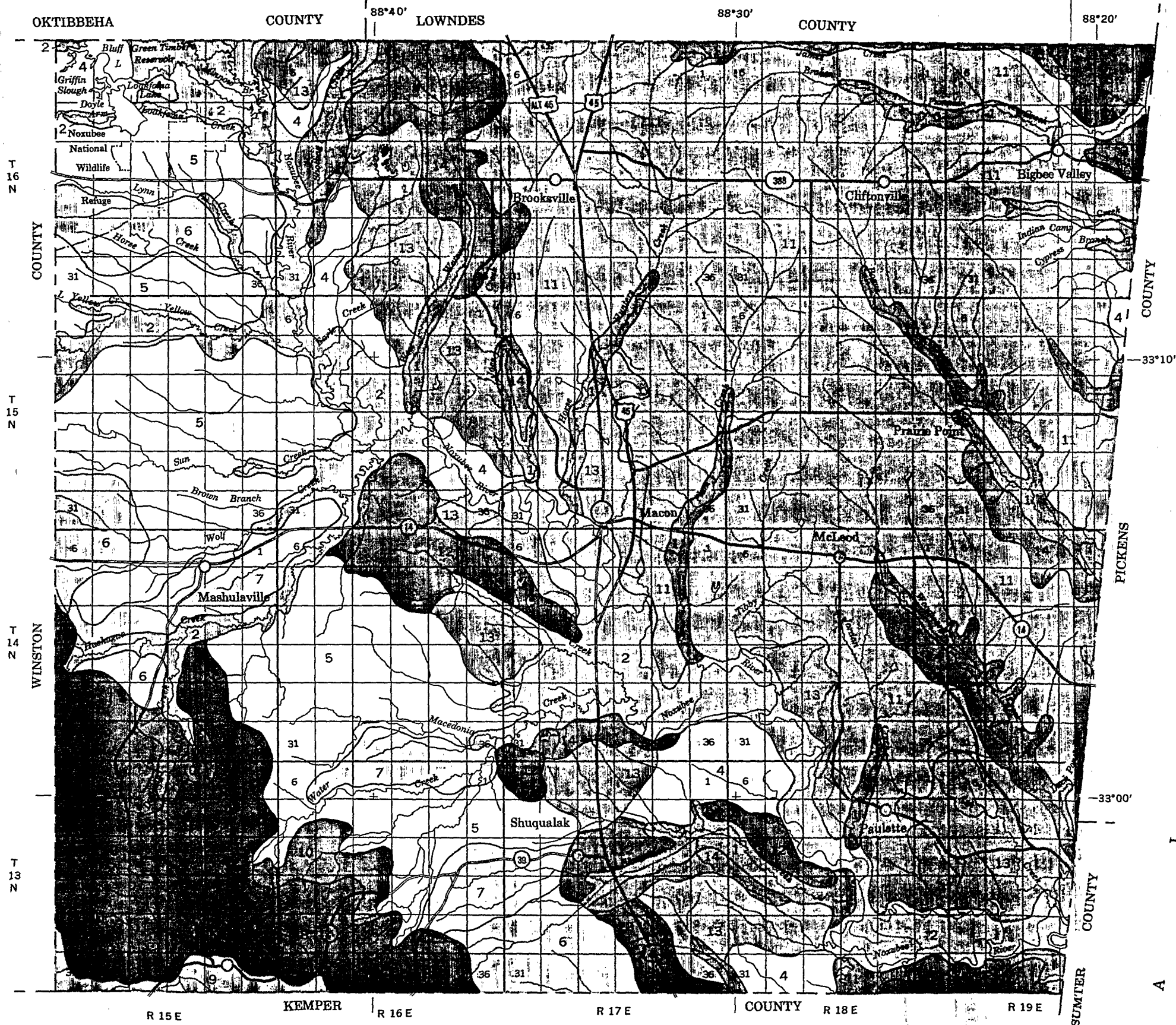


Figure 9.—Vaiden silty clay, 0 to 2 percent slopes, has high shrink-swell potential.

This Vaiden soil ranges from very strongly acid to medium acid in the surface layer and in the subsoil. It ranges from very strongly acid to mildly alkaline in the underlying material. Permeability is very slow, and the available water capacity is moderate. Runoff is slow. Erosion is a slight hazard. The seasonal high water table is at a depth of 1 foot to 2 feet during wet periods. The surface layer is sticky when wet, and it is hard when dry. If tilled when the soil is too wet or too dry, clods tend to form. The optimum range of moisture content for tilling



LEGEND*

- DOMINANTLY NEARLY LEVEL AND GENTLY SLOPING SOILS ON FLOOD PLAINS AND STREAM TERRACES**
- 1 Leeper-Catalpa: Nearly level, somewhat poorly drained and moderately well drained, clayey silt loams; on flood plains and stream terraces
 - 2 Urbo-Mantachie-Quitman: Nearly level, somewhat poorly drained, silty and loamy soils and moderately well drained, loamy soils; on flood plains and stream terraces
 - 3 Latonia-Cahaba: Nearly level and gently sloping, well drained, loamy soils; on stream terraces
- DOMINANTLY NEARLY LEVEL TO SLOPING SOILS ON UPLANDS AND STREAM TERRACES**
- 4 Stough-Freest-Vimville: Nearly level and gently sloping, somewhat poorly drained, moderately well drained, loamy soils; on stream terraces and uplands
 - 5 Falkner-Longview-Savannah: Nearly level to sloping, somewhat poorly drained, silty soils and moderately well drained, loamy soils; on uplands and stream terraces
 - 6 Wilcox-Falkner: Nearly level to sloping, somewhat poorly drained, silty soils; on uplands
 - 7 Stough-Prentiss: Nearly level and gently sloping, somewhat poorly drained and moderately well drained, loamy soils; on stream terraces and uplands
- DOMINANTLY GENTLY SLOPING TO STEEP SOILS ON UPLANDS**
- 8 Smithdale-Sweetman: Steep, well drained, loamy and silty soils; on uplands
 - 9 Smithdale-Savannah: Gently sloping to steep, well drained and moderately well drained, loamy soils; on uplands
 - 10 Wilcox: Moderately steep to steep, somewhat poorly drained, silty soils; on uplands
- DOMINANTLY NEARLY LEVEL TO MODERATELY STEEP SOILS OVER CHALK ON UPLANDS**
- 11 Vaiden-Brooksville-Okolona: Nearly level to sloping, somewhat poorly drained and well drained, loamy soils; on uplands
 - 12 Kipling-Freest: Nearly level to sloping, somewhat poorly drained, silty soils and moderately well drained, loamy soils; on uplands
 - 13 Kipling-Savannah-Okibbeha: Gently sloping to moderately steep, somewhat poorly drained, silty soils and moderately well drained, loamy and silty soils; on uplands
 - 14 Sumter-Kipling: Nearly level to moderately steep, well drained, clayey soils and somewhat poorly drained, loamy soils; on uplands
- *Texture given in the descriptive heading is that of the surface layer of the major soil or soils in each area.

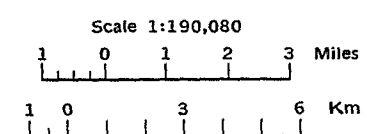
COMPILED 1985

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MISSISSIPPI AGRICULTURAL AND FORESTRY EXPERIMENT STATION

GENERAL SOIL MAP NOXUBEE COUNTY, MISSISSIPPI

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



Each area outlined on this map more than one kind of soil. The map is for general planning rather than for decisions on the use of specific soils.

SOIL LEGEND

Soil map publication symbols and map unit names are alphabetical. Map symbols are letters. The first letter, always a capital, is the initial letter of the soil series name or miscellaneous area. The second letter is a small letter except for broadly defined map units, in which case it is a capital letter. The third letter, where used, is always a capital letter and denotes slope or landform. A final number of 2 or 3 shows that the soil is eroded or severely eroded. Broadly defined map units, in addition to having all capital letter symbols, are further indicated by the footnote 1/. Symbols with only two letters, one upper case and one lower case, indicate nearly level to gently sloping soils subject to flooding, or are miscellaneous areas.

SYMBOL	NAME	SYMBOL	NAME
Be	Belden silt loam, frequently flooded	Pt	Pits - Udorthents complex
BrA	Brooksville silty clay, 0 to 1 percent slopes	PuA	Prentiss fine sandy loam, 0 to 2 percent slopes
BrB	Brooksville silty clay, 1 to 3 percent slopes	PuB	Prentiss fine sandy loam, 2 to 5 percent slopes
CaA	Cahaba fine sandy loam, 0 to 2 percent slopes	PX	Prentiss-Stough association, undulating 1/
Cp	Catalpa silty clay, occasionally flooded	QU	Quitman fine sandy loam, undulating, occasionally flooded 1/
DeC2	Demopolis-Binnsville complex, 2 to 8 percent slopes, eroded	RuB2	Ruston fine sandy loam, 2 to 5 percent slopes, eroded
FaA	Falkner silt loam, 0 to 2 percent slopes	RuC2	Ruston fine sandy loam, 5 to 8 percent slopes, eroded
FaB	Falkner silt loam, 2 to 5 percent slopes	SaA	Savannah fine sandy loam, 0 to 2 percent slopes
FK	Falkner silt loam, level 1/	SaB	Savannah fine sandy loam, 2 to 5 percent slopes
FrA	Freest fine sandy loam, 0 to 2 percent slopes	SaC2	Savannah fine sandy loam, 5 to 8 percent slopes, eroded
FrB	Freest fine sandy loam, 2 to 5 percent slopes	SaD2	Savannah fine sandy loam, 8 to 12 percent slopes, eroded
Gr	Griffith silty clay, occasionally flooded	SeA	Sessum silty clay, 0 to 2 percent slopes
Je	Jena fine sandy loam, occasionally flooded	SmD2	Smithdale sandy loam, 8 to 15 percent slopes, eroded
KpA	Kipling silt loam, 0 to 2 percent slopes	SmF3	Smithdale sandy loam, 15 to 30 percent slopes, severely eroded
KpB2	Kipling silt loam, 2 to 5 percent slopes, eroded	SP	Smithdale-Lucy association, hilly 1/
KpC2	Kipling silt loam, 5 to 8 percent slopes, eroded	StA	Stough fine sandy loam, 0 to 2 percent slopes
KpD2	Kipling silt loam, 8 to 12 percent slopes, eroded	SuB2	Sumter silty clay, 2 to 5 percent slopes, eroded
La	Latonia fine sandy loam, occasionally flooded	SuD2	Sumter silty clay, 5 to 12 percent slopes, eroded
LC	Latonia-Cahaba association occasionally flooded 1/	SuE2	Sumter silty clay, 12 to 17 percent slopes, eroded
Le	Leeper silty clay, occasionally flooded	SvE3	Sumter-Demopolis-Rock outcrop, chalk complex, 5 to 20 percent slopes, severely eroded
LL	Leeper-Catalpa association frequently flooded 1/	SW	Sweetman-Smithdale association, hilly 1/
LoA	Longview silt loam, 0 to 2 percent slopes	TaA	Talla loam, 0 to 2 percent slopes
LR	Longview-Falkner association undulating 1/	Ub	Urbo silty clay loam, occasionally flooded
LuA	Lucedale fine sandy loam, 0 to 2 percent slopes	UM	Urbo-Mantachie association, occasionally flooded 1/
Ma	Mantachie loam, occasionally flooded	VaA	Vaiden silty clay, 0 to 2 percent slopes
Me	Marietta loam, occasionally flooded	VaB2	Vaiden silty clay, 2 to 5 percent slopes, eroded
Mo	Mooreville loam, occasionally flooded	VaC2	Vaiden silty clay, 5 to 8 percent slopes, eroded
Oc	Ochlocknee fine sandy loam, occasionally flooded	VmA	Vimville loam, 0 to 2 percent slopes
OkA	Okolona silty clay, 0 to 1 percent slopes	WcB2	Wilcox silty clay loam, 2 to 5 percent slopes, eroded
OkB	Okolona silty clay, 1 to 3 percent slopes	WcC2	Wilcox silty clay loam, 5 to 8 percent slopes, eroded
OtB2	Oktibbeha silty clay loam, 2 to 5 percent slopes, eroded	WcD2	Wilcox silty clay loam, 8 to 15 percent slopes, eroded
OtC2	Oktibbeha silty clay loam, 5 to 8 percent slopes, eroded	WcF	Wilcox silty clay loam, 15 to 35 percent slopes
OuE2	Oktibbeha-Sumter complex, 8 to 15 percent slopes, eroded	WD	Wilcox silty clay loam, rolling 1/
OuF2	Oktibbeha-Sumter complex, 15 to 25 percent slopes, eroded	WF	Wilcox-Falkner association, undulating 1/

1/ Broadly defined map units. Fewer soil examinations were made in these mapping units, and delineations and included areas are generally larger. The mapping units were designed primarily for woodland management.

CULTURA

BOUNDARIES

National, state or

County or parish

Minor civil division

Reservation (national
state forest or
and large airport)

Land grant

Limit of soil survey

Field sheet matchline

AD HOC BOUNDARIES

Small airport, airfield,
cemetery, or flood

STATE COORDINATES

LAND DIVISION COORDINATES
(sections and land)

ROADS

Divided (median strip
if scale permits)

Other roads

Trail

ROAD EMBLEM & MARKERS

Interstate

Federal

State

County, farm or ranch

RAILROAD

POWER TRANSMISSION LINES
(normally not shown)PIPE LINE
(normally not shown)FENCE
(normally not shown)

LEVEES

Without road

With road

With railroad

DAMS

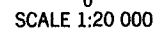
Large (to scale)

Medium or small

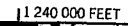
PITS

Gravel pit

Mine or quarry



(Joins sheet 31)



(Joins sheet 25)

NOXUBEE COUNTY, MISSISSIPPI

ENDANGERED AND THREATENED SPECIES



U.S. FISH AND WILDLIFE SERVICE
REGION 4 - ATLANTA

REFERENCE 13

9/87

Federally Listed Species by State

MISSISSIPPI

(E=Endangered; T=Threatened; CH=Critical Habitat determined)

Mammals

General Distribution

Panther, Florida

- (Felis concolor coryi) - E
 Whale, right (Eubalaena glacialis) - E
 Whale, finback (Balaenoptera physalus) - E
 Whale, humpback (Megaptera novaeangliae) - E
 Whale, sei (Balaenoptera borealis) - E
 Whale, sperm (Physeter catodon) - E

Entire state
 Coastal waters
 Coastal waters
 Coastal waters
 Coastal waters
 Coastal waters

Birds

Crane, Mississippi sandhill

- (Grus canadensis pulla) - E, CH
 Eagle, bald (Haliaeetus leucocephalus) - E
 Falcon, Arctic peregrine
 (Falco peregrinus tundrius) - T
 Pelican, brown (Pelecanus occidentalis) - E
 Plover, piping (Charadrius melodus) - T
 Tern, least (Sterna antillarum);
 interior population - E
 Warbler, Bachman's (Vermivora bachmanii) - E
 Woodpecker, ivory-billed
 (Campephilus principalis) - E
 Woodpecker, red-cockaded
 (Picoides (=Dendrocopos) borealis) - E

Southern Jackson County
 Entire state

 Entire state
 Coast
 Coast

 Mississippi River
 Entire state

 West, South, East
 Central

 Entire state

Reptiles

Alligator, American

- (Alligator mississippiensis) - T (S/A)*
 Snake, eastern indigo
 (Drymarchon corais couperi) - T
 Tortoise, gopher (Gopherus polyphemus) - T
 Turtle, Kemp's (Atlantic) ridley
 (Lepidochelys kempi) - E
 Turtle, green (Chelonia mydas) - T

South and West

 South
 Lower Gulf Coastal
 Plain (14 counties)

 Coastal waters
 Coastal waters

MISSISSIPPI (cont'd)

General Distribution

Turtle, hawksbill
(Eretmochelys imbricata) - E
Turtle, loggerhead (Caretta caretta) - T
Turtle, ringed sawback
(Graptemys oculifera) - T

Coastal waters
Coastal waters

Pearl River

Fishes

Darter, bayou (Etheostoma rubrum) - T

Bayou Pierre drainage

Mollusks

Mussel, Curtus' (Pleurobema curtum) - E
Mussel, Judge Tait's (Pleurobema
taitianum) - E

East Fork Tombigbee River

East Fork Tombigbee River
and Buttahatchie River

Mussel, penitent (Epioblasma [=Dysnomia]
penita) - E

East Fork Tombigbee River.

Plants

Lindera melissifolia (Pondberry) - E

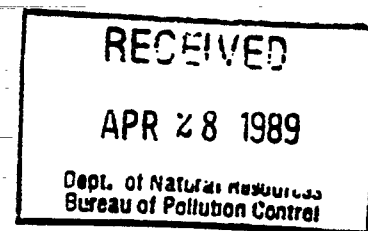
Sharkey and Sunflower
Counties

*Alligators are biologically neither endangered nor threatened. For law enforcement purposes they are classified as "Threatened due to Similarity of Appearance." Alligator hunting is regulated in accordance with State law.

*U.S. Fish and Wildlife Service
Checklist Office*

SPECIES LIST BY COUNTY

E - Endangered Species
T - Threatened Species
P - Proposed Species
C - Candidate Species
CA - Conservation Agreement
CH - Critical Habitat



Reference 13

Jasper	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
Jones	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
	T - Gopher tortoise (<u>Gopherus polyphemus</u>)	
	C - Yellowblotched sawback - <u>Graptemys flavimaculata</u>	
Lawrence	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
Lamar	T - Gopher tortoise (<u>Gopherus polyphemus</u>)	
Leake	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
Lowndes	E - Judge Tait's mussel (<u>Pleurobema taitianum</u>)	
	E - Penitent shell mussel (<u>Pleurobema penita</u>)	
Madison	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
Marion	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
	T - Gopher tortoise (<u>Gopherus polyphemus</u>)	
Monroe	E - Curtus' mussel (<u>Pleurobema curtum</u>)	Black clubshell
	E - Penitent shell mussel (<u>Epioblasma penita</u>)	Southern combshell
	E - Judge Tait's mussel (<u>Pleurobema taitianum</u>)	Southern pink pigtoe
	C - Southern clubshell <u>Pleurobema decisum</u>	
Neshoba	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
Noxubee	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
Oktibbeha	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
Pearl River	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
	T - Gopher tortoise (<u>Gopherus polyphemus</u>)	
Perry	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
	T - Gopher tortoise (<u>Gopherus polyphemus</u>)	
	C - Yellowblotched sawback - <u>Graptemys flavimaculata</u>	
Rankin	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
Scott	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
Simpson	T - Ringed sawback turtle (<u>Graptemys oculifera</u>)	
Smith	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
Stone	E - Red-cockaded woodpecker (<u>Picoides borealis</u>)	
	E - Eastern indigo snake (<u>Drymarchon corais couperi</u>)	
	T - Gopher tortoise (<u>Gopherus polyphemus</u>)	
Sharkey	E - Pondberry (<u>Lindera melissifolia</u>)	
Sunflower	E - Pondberry (<u>Lindera melissifolia</u>)	

Endangered Species

O F M I S S I S S I P P I

MUSSELS

Federal Status

Alabama Moccasinshell (<i>Medionidus acutissimus</i>)	Threatened (Proposed)
Black clubshell (<i>Pleurobema curtum</i>)	Endangered
Inflated Heelsplitter (<i>Potamilus inflatus</i>)	Threatened
Orange-nacre Mucket (<i>Lampsilis perovalis</i>)	Threatened (Proposed)
Ovate Clubshell (<i>Pleurobema perovatum</i>)	Endangered (Proposed)
Southern Clubshell (<i>Pleurobema decisum</i>)	Endangered (Proposed)
Southern Combshell (<i>Epioblasma penita</i>)	Endangered
Southern Pink Pigtoe (<i>Pleurobema taitianum</i>)	Endangered
Southern Round Pigtoe (<i>Pleurobema marshalli</i>)	Endangered
Stirrupshell (<i>Quadrula stapes</i>)	Endangered

INSECT

American Burying Beetle (<i>Nicrophorus americanus</i>)	Endangered
---	------------

FISH

Southern Redbelly Dace ¹ (<i>Phoxinus erythrogaster</i>)	None
Bayou Darter (<i>Etheostoma rubrum</i>)	Threatened
Crystal Darter (<i>Crystallaria asprella</i>)	Candidate, Category 2
Frecklebelly Madtom (<i>Noturus munitus</i>)	Candidate, Category 2
Alabama Sturgeon (<i>Scaphirhynchus suttkusi</i>)	Candidate, Category 1
Gulf Sturgeon (<i>Acipenser oxyrinchus desotoi</i>)	Threatened
Pallid Sturgeon (<i>Scaphirhynchus albus</i>)	Endangered

AMPHIBIANS

Dusky Gopher Frog (<i>Rana capito sevosa</i>)	Candidate, Category 1
Cave Salamander (<i>Eurycea lucifuga</i>)	None
Green Salamander (<i>Aneides aeneus</i>)	Candidate Category 2
Spring Salamander (<i>Gyrinophilus porphyriticus</i>)	None

REPTILES

Black Pine Snake (<i>Pituophis melanoleucus lodongi</i>)	Candidate Category 2
Eastern Indigo Snake (<i>Drymarchon corais couperi</i>)	Threatened
Rainbow Snake (<i>Farancia erytrogramma</i>)	None
Southern Hognose Snake (<i>Heterodon simus</i>)	None
An Undescribed Redbelly Turtle (<i>Pseudemys</i> sp.)	None
Black-knobbed Sawback (<i>Graptemys nigrinoda</i>)	None
Ringed Sawback (<i>Graptemys oculifera</i>)	Threatened
Yellow-blotched Sawback (<i>Graptemys flavimaculata</i>)	Threatened
Gopher Tortoise (<i>Gopherus polyphemus</i>)	Threatened
Atlantic Ridley (<i>Lepidochelys kempi</i>)	Endangered
Green Turtle (<i>Chelonia mydas</i>)	Threatened
Hawksbill Turtle (<i>Eretmochelys imbricata</i>)	Endangered
Loggerhead Turtle (<i>Caretta caretta</i>)	Threatened
Leatherback Turtle (<i>Dermochelys coriacea</i>)	Endangered

BIRDS

Mississippi Sandhill Crane (<i>Grus canadensis pulla</i>)	Endangered
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Endangered
Peregrine Falcon (<i>Falco peregrinus</i>)	Endangered
Brown Pelican (<i>Pelecanus occidentalis</i>)	Endangered
Piping Plover (<i>Charadrius melodus</i>)	Threatened
Snowy Plover (<i>Charadrius alexandrinus</i>)	Candidate, Category 2
Wood Stork (<i>Mycteria americana</i>)	None
Least Tern ² (<i>Sterna antillarum</i>)	Endangered
Bachman's Warbler (<i>Vermivora bachmanii</i>)	Endangered
Ivory-billed woodpecker (<i>Campephilus principalis</i>)	Endangered
Red-cockaded Woodpecker (<i>Picoides borealis</i>)	Endangered
Bewick's Wren (<i>Thryomanes bewickii</i>)	None

MAMMALS

Gray Bat (<i>Myotis grisescens</i>)	Endangered
Indiana Bat (<i>Myotis sodalis</i>)	Endangered
Black Bear (<i>Ursus americanus</i>)	Threatened
West Indian Manatee (<i>Trichechus manatus</i>)	Endangered
Florida Panther (<i>Felis concolor coryi</i>)	Endangered
Whales, Order Cetacea, excluding Family Delphinidae	

PLANT

Pondberry Spicebush (*Lindera melissifolia*)
 Price's Potato Bean (*Apios priceana*)

¹West Mississippi disjunct population

²Interior population nesting along the Mississippi River

Endangered Species of Mississippi
 Miss. Department of Wildlife,
 Fisheries & Parks
 Museum of Natural Science
 111 North Jefferson Street
 Jackson, MS 39201
 (601) 354-7303

Funded in part by:
 US Fish and Wildlife Service

EPA in cooperation with Mississippi
 Department of Agriculture and
 Commerce, Bureau of Plant Industry

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U.S. DEPARTMENT OF COMMERCE

FREDERICK H. MUELLER, *Secretary*

WEATHER BUREAU

F. W. REICHELDERFER, *Chief*

TECHNICAL PAPER NO. 37

Evaporation Maps for the United States

M. A. KOHLER, T. J. NORDENSON, and D. R. BAKER

Hydrologic Services Division



WASHINGTON, D.C.

1959

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. - Price 65 cents

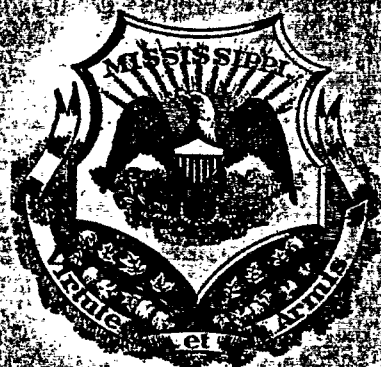
REFERENCE 15

Prepared by
HYDROLOGIC INVESTIGATIONS SECTION
HYDROLOGIC SERVICES DIVISION
WEATHER BUREAU
Washington, D C August 1959

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& TOPOGRAPHICAL SURVEY

MISSISSIPPI STATE GEOLOGICAL SURVEY

WILLIAM CLIFFORD MORSE, Ph.D.
Director



BULLETIN 40

THE UPPER CRETACEOUS DEPOSITS

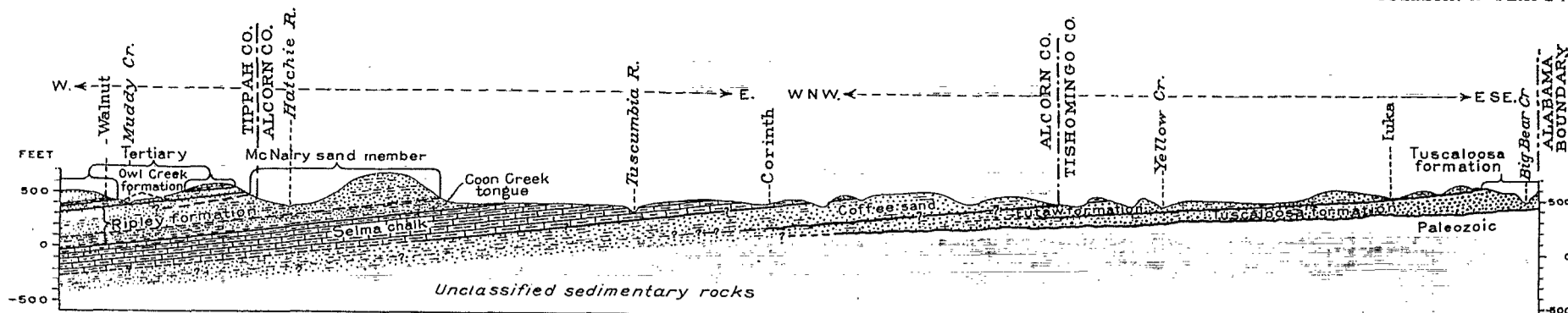
BY
LLOYD WILLIAM STEPHENSON
and
WATSON HINER MONROE

In cooperation with the
United States Geological Survey

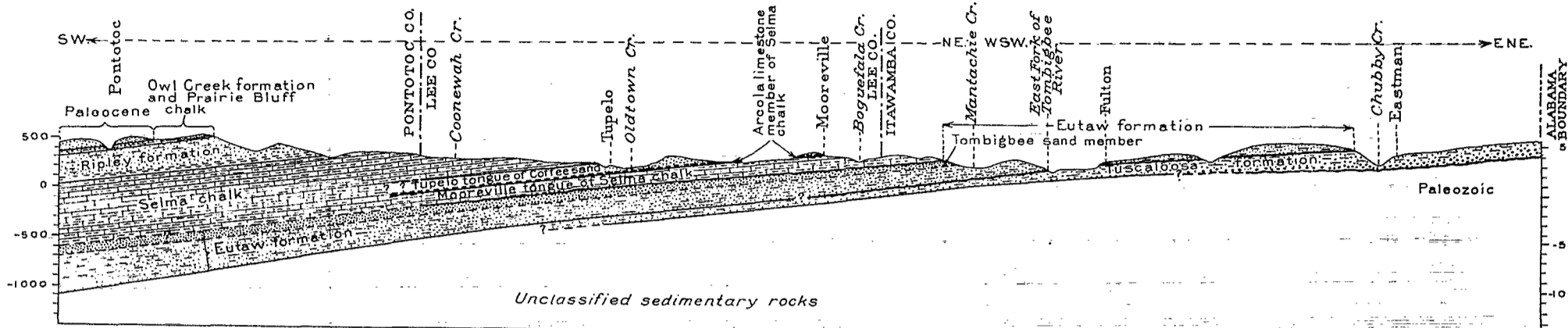
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Please do not destroy this report; rather return it to the Mississippi Geological Survey,
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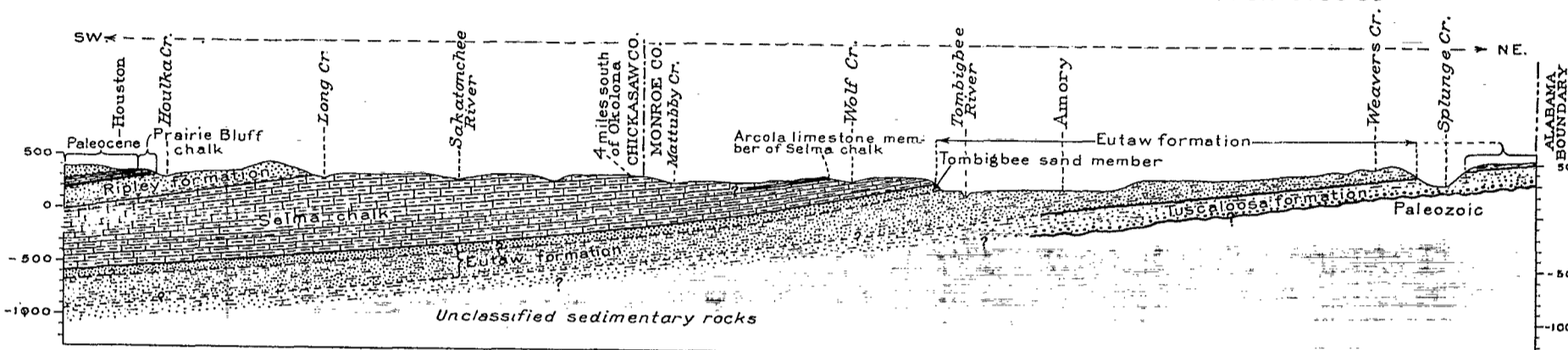
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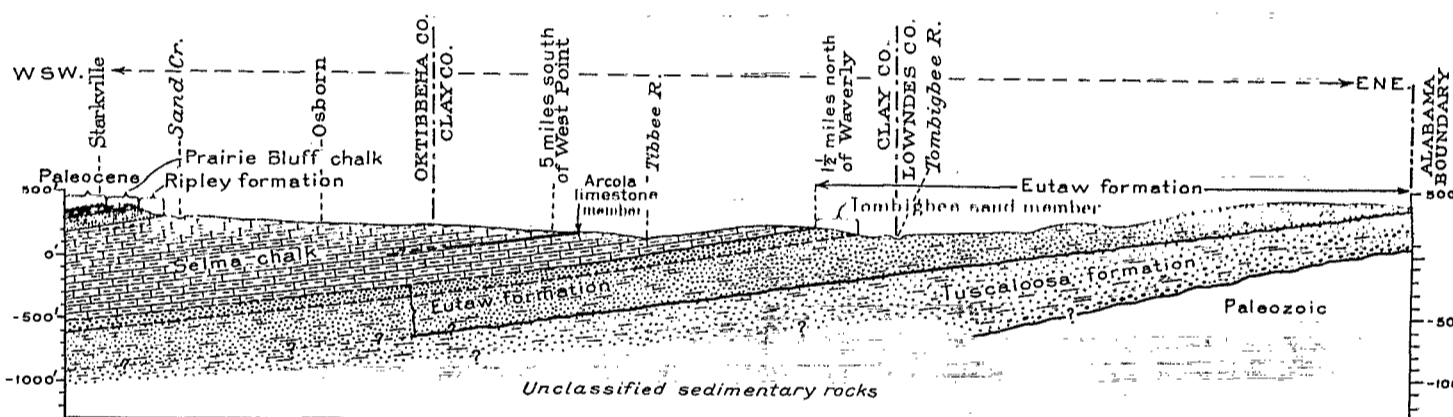
A-A' FROM THE ALABAMA BOUNDARY SOUTHEAST OF IUKA, TISHOMINGO CO., VIA CORINTH TO WALNUT, TIPPDAH CO.



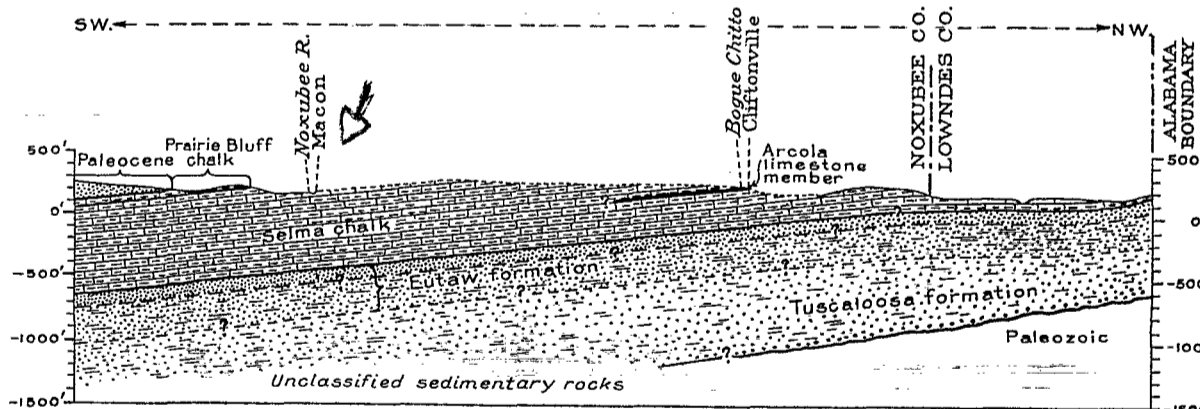
B-B' FROM THE ALABAMA BOUNDARY NORTHEAST OF EASTMAN, ITAWAMBA CO., VIA FULTON TO PONTOTOC, PONTOTOC CO.



C-C' FROM THE ALABAMA BOUNDARY IN NORTHEASTERN MONROE COUNTY TO HOUSTON, CHICKASAW COUNTY

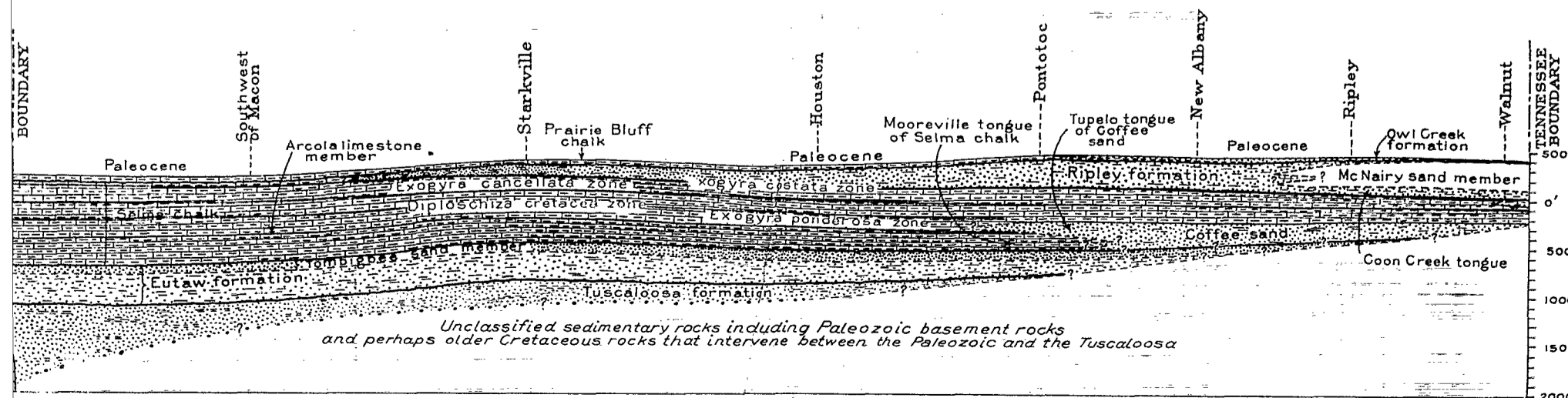


D-D' FROM THE ALABAMA BOUNDARY IN NORTHEASTERN LOWNDES CO., TO STARKVILLE, OKTIBBEHA CO.



E-E' FROM THE ALABAMA BOUNDARY IN SOUTHEASTERN LOWNDES CO., TO THE CRETACEOUS-PALEOCENE CONTACT SOUTHWEST OF MACON, NOXUBEE CO.

Horizontal scale
0 5 10 Miles

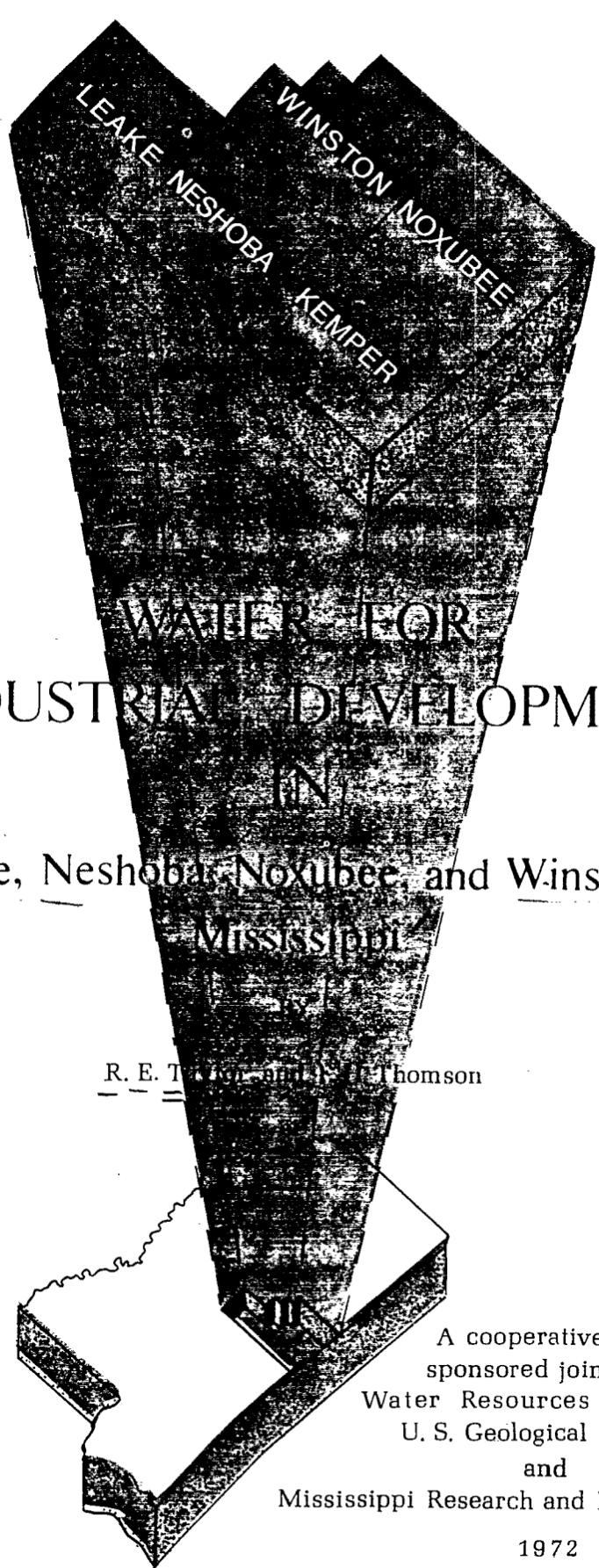


F-F' FROM THE TENNESSEE BOUNDARY IN TIPPDAH COUNTY, TO THE ALABAMA BOUNDARY IN KEMPER COUNTY, SHOWING THE RELATION OF THE UPPER CRETACEOUS LITHOLOGIC UNITS TO THE FAUNAL ZONES

Horizontal scale

10 20 Miles

TD



WATER FOR
INDUSTRIAL DEVELOPMENT
IN

Kemper, Leake, Neshoba, Noxubee, and Winston Counties,
Mississippi

R. E. Thompson and J. L. Thomson

A cooperative study
sponsored jointly by
Water Resources Division,
U. S. Geological Survey
and
Mississippi Research and Development Center

1972

Reference 18

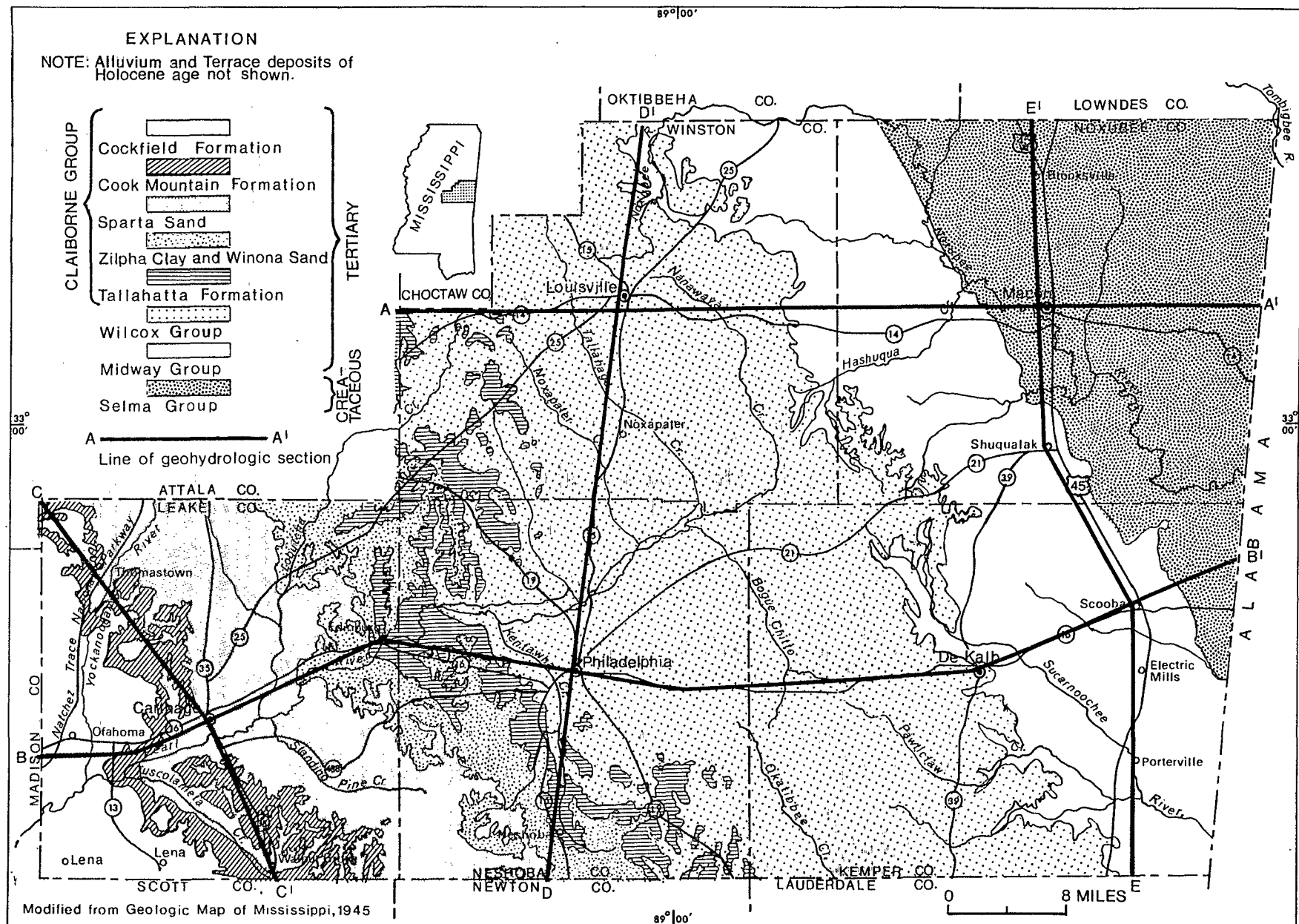


Figure 3. Areal geology of Kemper, Leake, Neshoba, Noxubee, and Winston Counties.

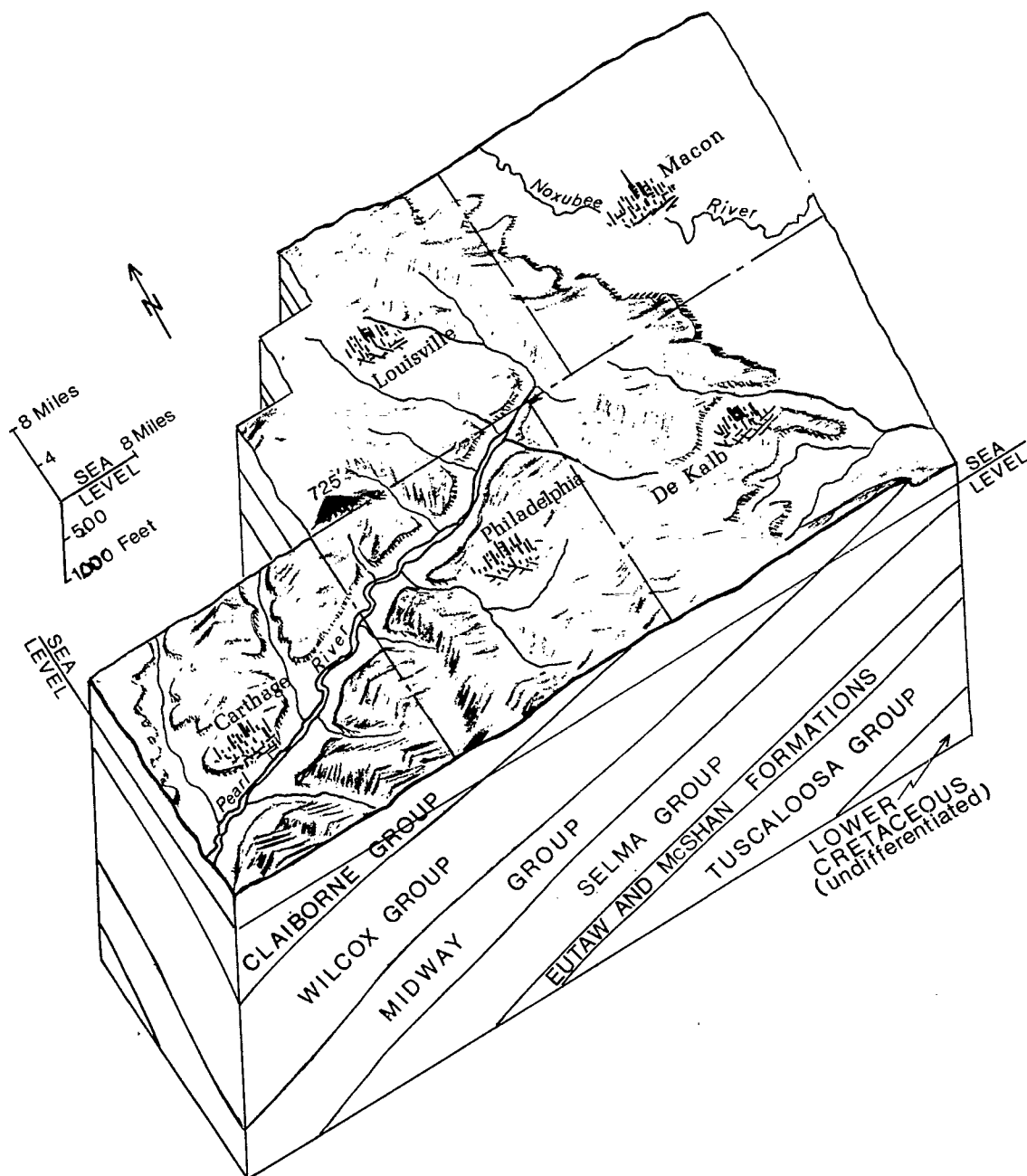


Figure 4. Block diagram of Kemper, Leake, Neshoba, Noxubee, and Winston Counties.

Table 1.—Geologic units and their water-bearing character

Era	System	Series	Group	Statigraphic unit	Un-eroded thickness (ft)	Water-bearing character	
Cenozoic	Tertiary	Holocene		Alluvium and terrace deposits	0-50±	Small yields to shallow wells.	
		Eocene	Claiborne	Cockfield Formation	250+	Large yields to wells only where sand beds are thick; small to moderate yields elsewhere. Available only in western and southwestern parts of Leake County.	
				Cook Mountain Formation	160	Small yields to shallow wells in Leake County.	
				Sparta Sand	160-260	Moderate to large yields to wells in Leake and Neshoba Counties.	
				Zilpha Clay	60-200	Not an aquifer.	
				Winona Sand	20-60	Small yields to wells in Leake and Neshoba Counties.	
				Tallahatta Formation	230-270	Neshoba Sand Member—small yields to wells in Leake, Neshoba, and Winston Counties. Hydraulically connected in some areas with the Winona Sand, forming the Winona-Neshoba aquifer. Basic City Shale Member—small yields to wells in Leake, Neshoba, and Winston Counties. Meridian Sand Member—small to moderate yields to wells in Leake, Neshoba, and Winston Counties.	
			Wilcox	Hatchetigbee Formation	1,100-1,600	Small to moderate yields to wells. Many sand beds in the upper part of the formation are hydraulically connected with Meridian Sand Member of Tallahatta Formation, forming the Meridian-upper Wilcox aquifer, which supplies large wells in Leake, Neshoba, and Winston Counties.	
				Tusahoma Formation		Small to moderate yields to wells in Kemper, Leake, Neshoba, and Winston Counties. Irregular sand beds form the middle Wilcox aquifer.	
				Nanafalia Formation		Moderate to large yields to wells in Kemper, Leake, Neshoba and Winston Counties. Basal sand beds form the lower Wilcox aquifer. Sustains high base flow of some streams.	
			Paleocene	Midway	Naheola Formation	90-280	Small yields to wells in Kemper and Noxubee Counties. Many irregular sand beds in the upper part of the formation are hydraulically connected to the lower Wilcox aquifer.
					Porters Creek Clay	470-810	Not an aquifer.
		Clayton Formation			20-50	Not an aquifer.	
Mesozoic	Cretaceous	Upper Cretaceous	Selma	Undifferentiated	770-1,070	Not an aquifer.	
				Eutaw Formation and McShan Formation	280-480	Considered to be one water-bearing unit. Small to moderate yields to wells from thin aquifers; contains fresh water only in parts of Kemper and Noxubee Counties. Aggregate sand thickness ranges from 10 to 40 percent.	
			Tuscaloosa	Gordo Formation	300-500	Moderate to large yields to wells. Contains fresh water only in parts of Kemper, Noxubee, and Winston Counties. Aggregate sand thickness ranges from 25 to 60 percent.	
				Coker Formation	280-730	Upper unnamed member—small to moderate yields in places. Contains fresh water only in Kemper and Noxubee Counties. Eoline Member—not an aquifer. Massive sand—large yields to wells. Contains fresh water in all of Noxubee and parts of Kemper and Winston Counties. Constitutes a quarter to one-half of Coker Formation.	
		Lower Cretaceous		Undifferentiated	<300->3,000	Probably capable of large yields but not penetrated by water wells. Contains fresh water only in Noxubee and parts of Kemper and Winston Counties. Aggregate sand thickness ranges from 30 to 60 percent.	
Paleozoic				Undifferentiated consolidated rocks		Water-bearing character not known.	
Yields to wells: Large—more than 1 mgd. Moderate—0.1 to 1 mgd. Small—less than 0.1 mgd.							

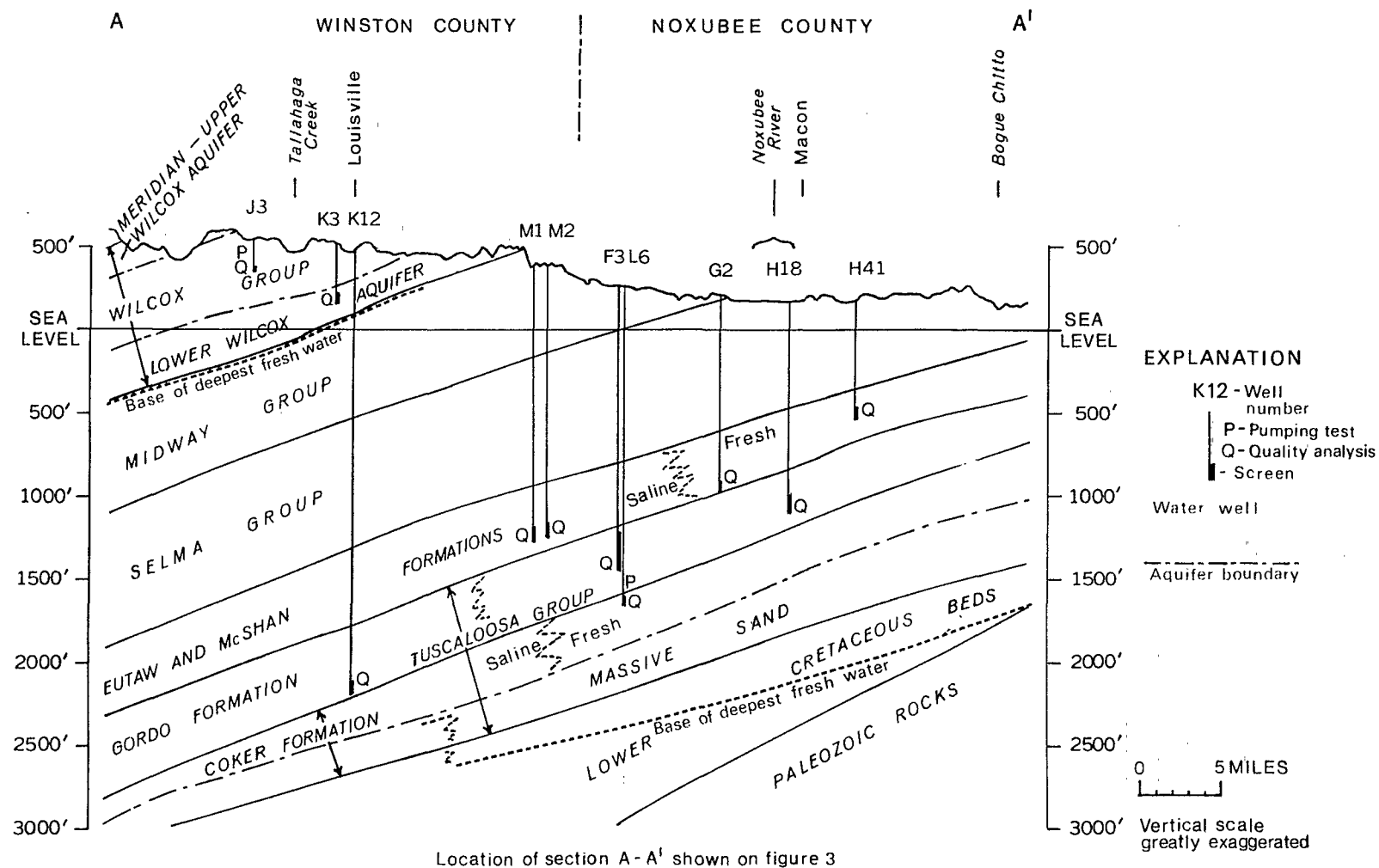


Figure 14. Geohydrologic section from western Winston County to eastern Noxubee County.

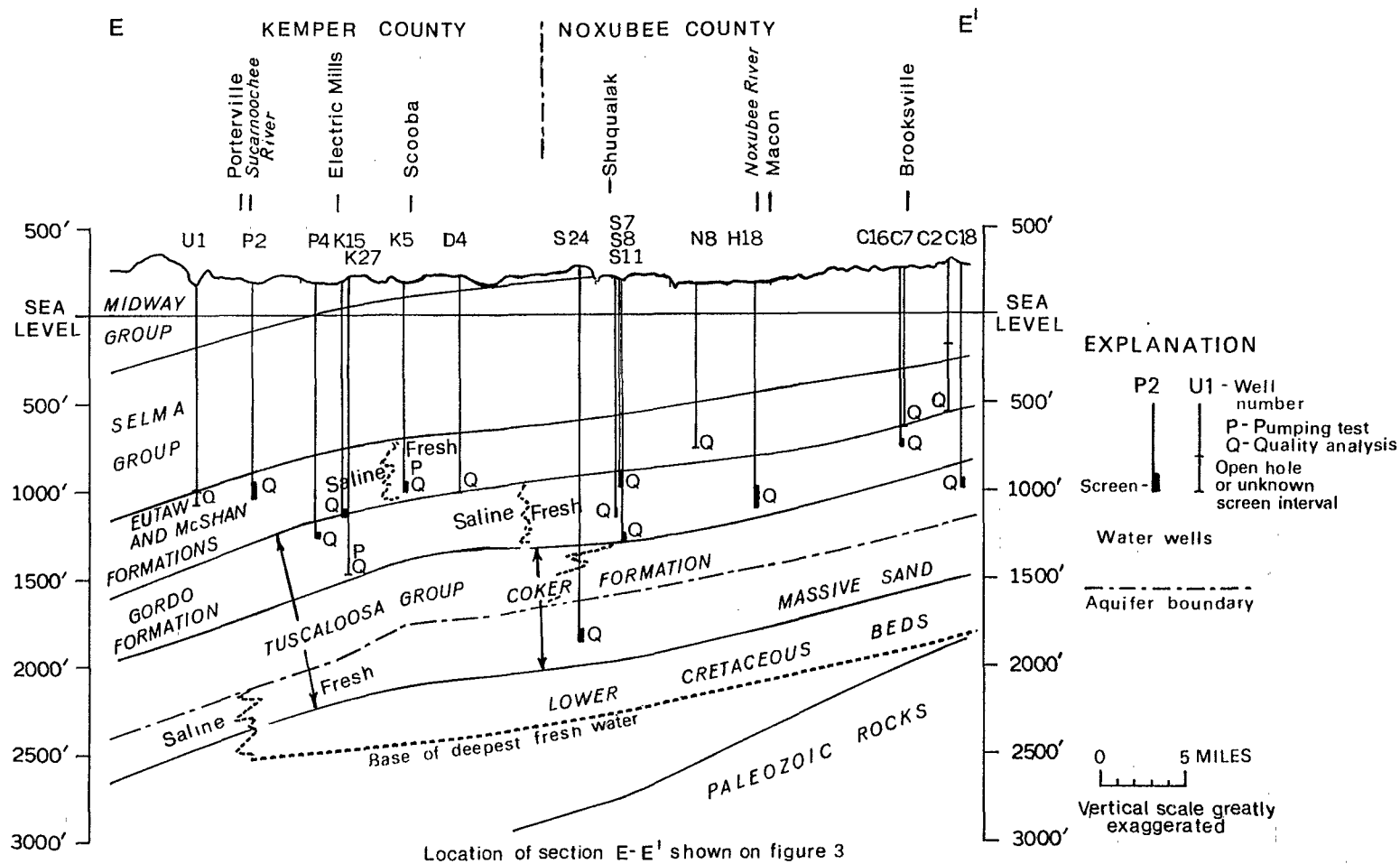


Figure 18. Geohydrologic section from southern Kemper County to northern Noxubee County.

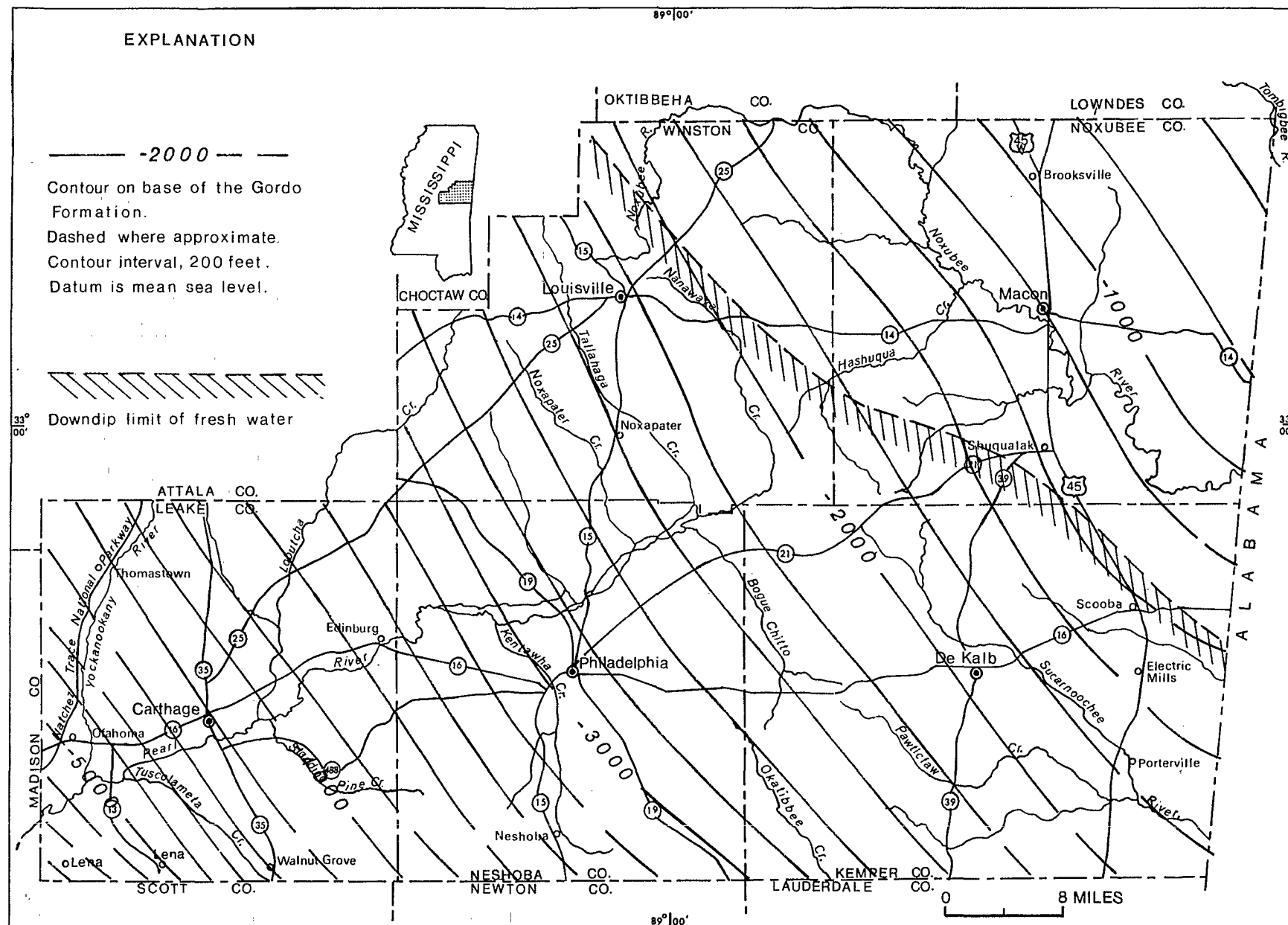


Figure 21. Contours on the base of the Gordo Formation in Kemper, Leake, Neshoba, Noxubee, and Winston Counties.

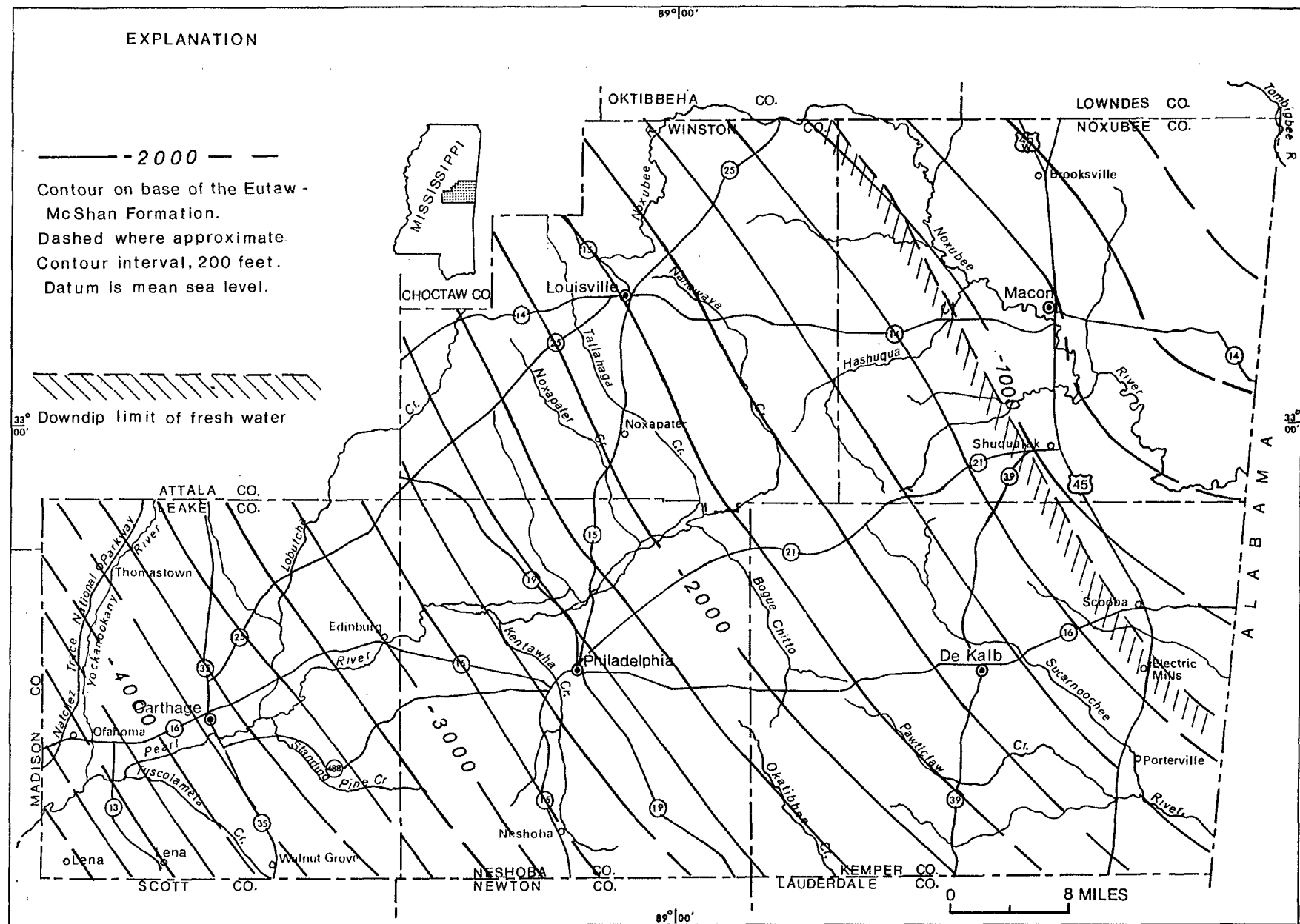


Figure 22. Contours on the base of the Eutaw-McShan Formation in Kemper, Leake, Neshoba, Noxubee, and Winston Counties.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CERCLA
SECTION

CHARACTERIZATION OF AQUIFERS DESIGNATED AS POTENTIAL
DRINKING WATER SOURCES IN MISSISSIPPI

by L. A. Gandl

Water-Resources Investigations
Open-File Report 81-550

Prepared in cooperation with the
Mississippi Department of Natural Resources,
Bureau of Pollution Control

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Jackson, Mississippi
1982



Water levels in the Coffee Sand have not changed significantly during the period of record and are highest in the northern end of the outcrop (fig. 43). Recharge is from precipitation on the outcrop and water moves downdip. Some water may move into the underlying Eutaw-McShan aquifer.

Five aquifer tests in sands of the Coffee aquifer indicate transmissivities from 930 to 1,200 ft²/d and hydraulic conductivities of 9 to 20 ft/d. Specific capacities are usually around 1 (gal/min)/ft, but as much as 15 (gal/min)/ft drawdown has been recorded.

Most wells in the Coffee Sand are low-yield domestic wells, although the yields of several public and industrial wells range from 50 to 600 gal/min. Increased use of the aquifer is feasible only on a small scale with low-yield wells.

Water in the Coffee Sand aquifer is a hard, calcium-magnesium-bicarbonate type near the outcrop. To the south and west of the outcrop, the water becomes a soft sodium-bicarbonate type. It is slightly alkaline and nearly colorless throughout. Figure 40 shows the downdip limits of fresh, slightly saline, and moderately saline water in the aquifer.

Eutaw-McShan Aquifer

The Eutaw-McShan aquifer crops out from Tishomingo to Lowndes County and dips westward at 30 ft/mi. It is composed of many thick to thin beds of sand, clay, and shale in the Eutaw and McShan Formations of Late Cretaceous Age. Figures 44 and 45 show the outcrop area and structure contours on the top and base of the aquifer. The aquifer is thickest in the south, exceeding 400 feet (fig. 46), and thins to the north, eventually disappearing. The Tombigbee Sand member of the Eutaw Formation is a massive, fine-grained, glauconitic, calcareous sand. The lower unnamed member of the Eutaw Formation and the McShan Formation are composed of thin irregular beds of fine-to-medium sized glauconitic sand and gray clay. The lower sand beds are the most permeable in the Eutaw-McShan aquifer. The Eutaw-McShan is hydraulically separated from the overlying Coffee Sand aquifer in some locations by the Mooreville Chalk. It is connected in some areas to the underlying Gordo aquifer although water movement is somewhat restricted by upper clay beds of the Gordo.

Water levels are highest at the northern end of the outcrop, and they have been lowered drastically in areas of heavy pumping, particularly at Tupelo in Lee County and at West Point in Clay County (fig. 47). Water levels are lower along the Tombigbee River, which runs north to south along the west edge of the outcrop.

Recharge is primarily from rainfall on the outcrop although some infiltration from the overlying Coffee Sand may occur in the northern part of the area. Water movement is downdip from the outcrop. In the confined part of the aquifer, water moves towards the center of two depressions in the potentiometric surface at Tupelo and West Point (fig. 47).

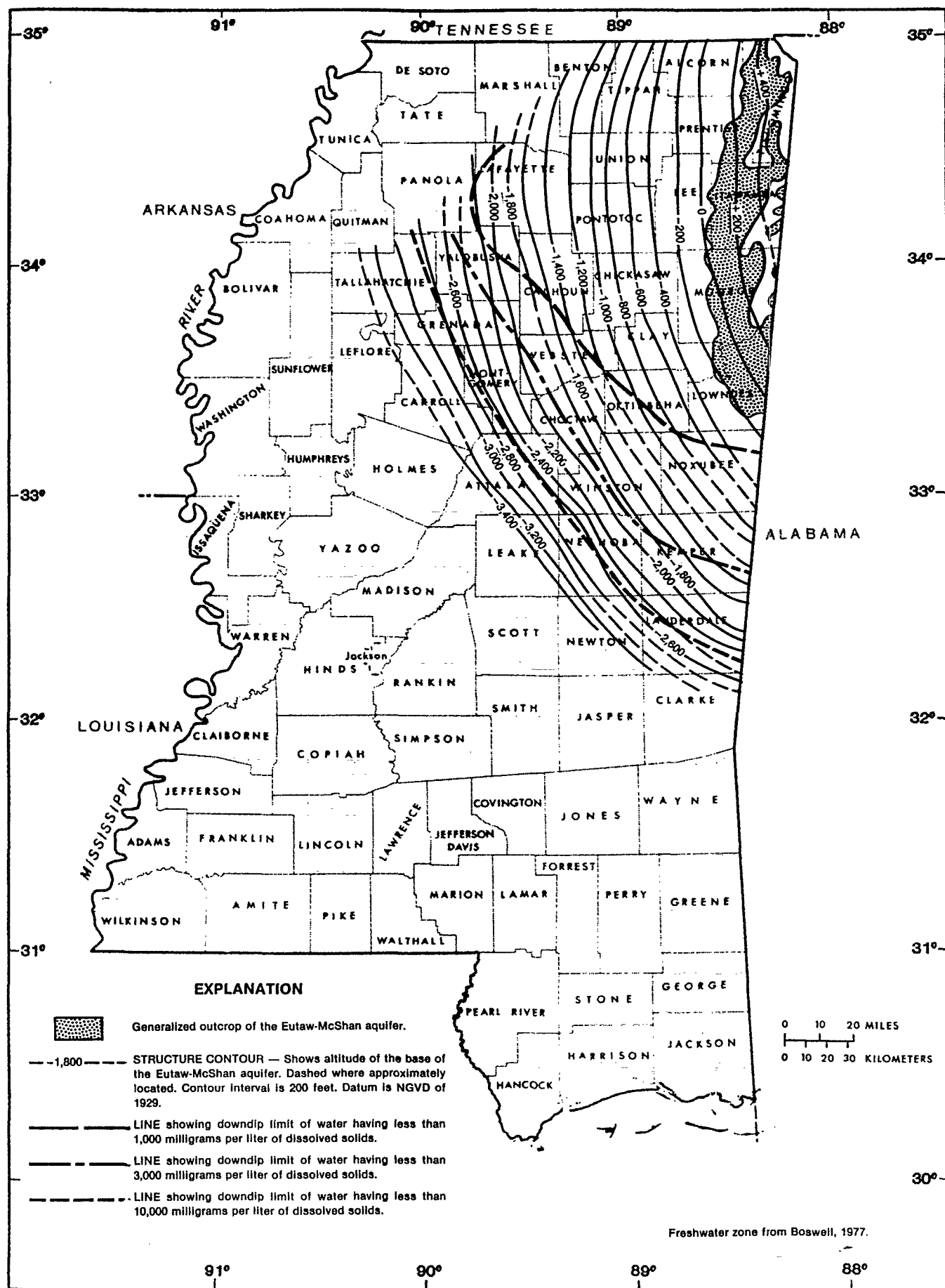


Figure 44. — Configuration of the base of the Eutaw-McShan aquifer.

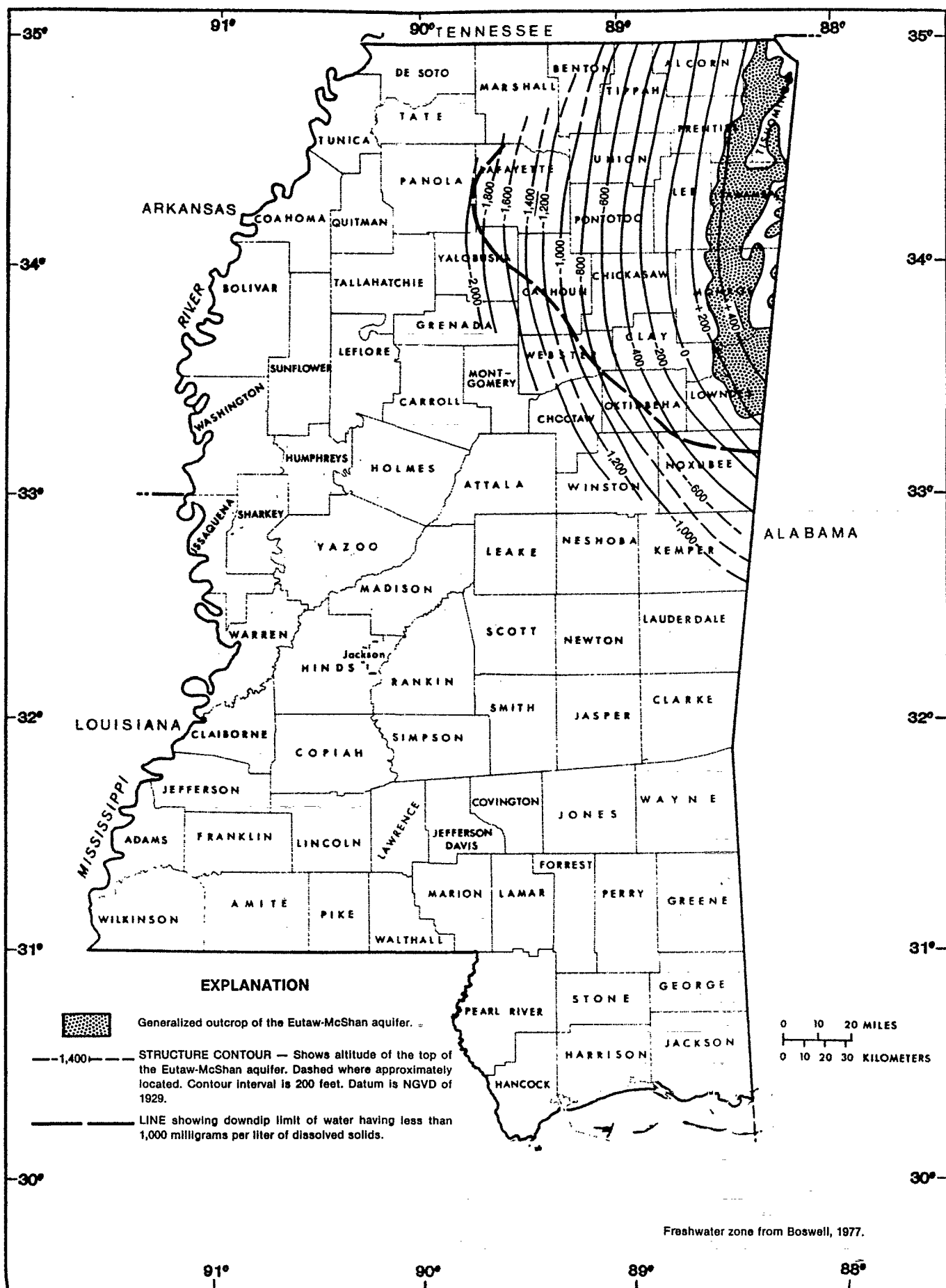


Figure 45. — Configuration of the top of the Eutaw-McShan aquifer.

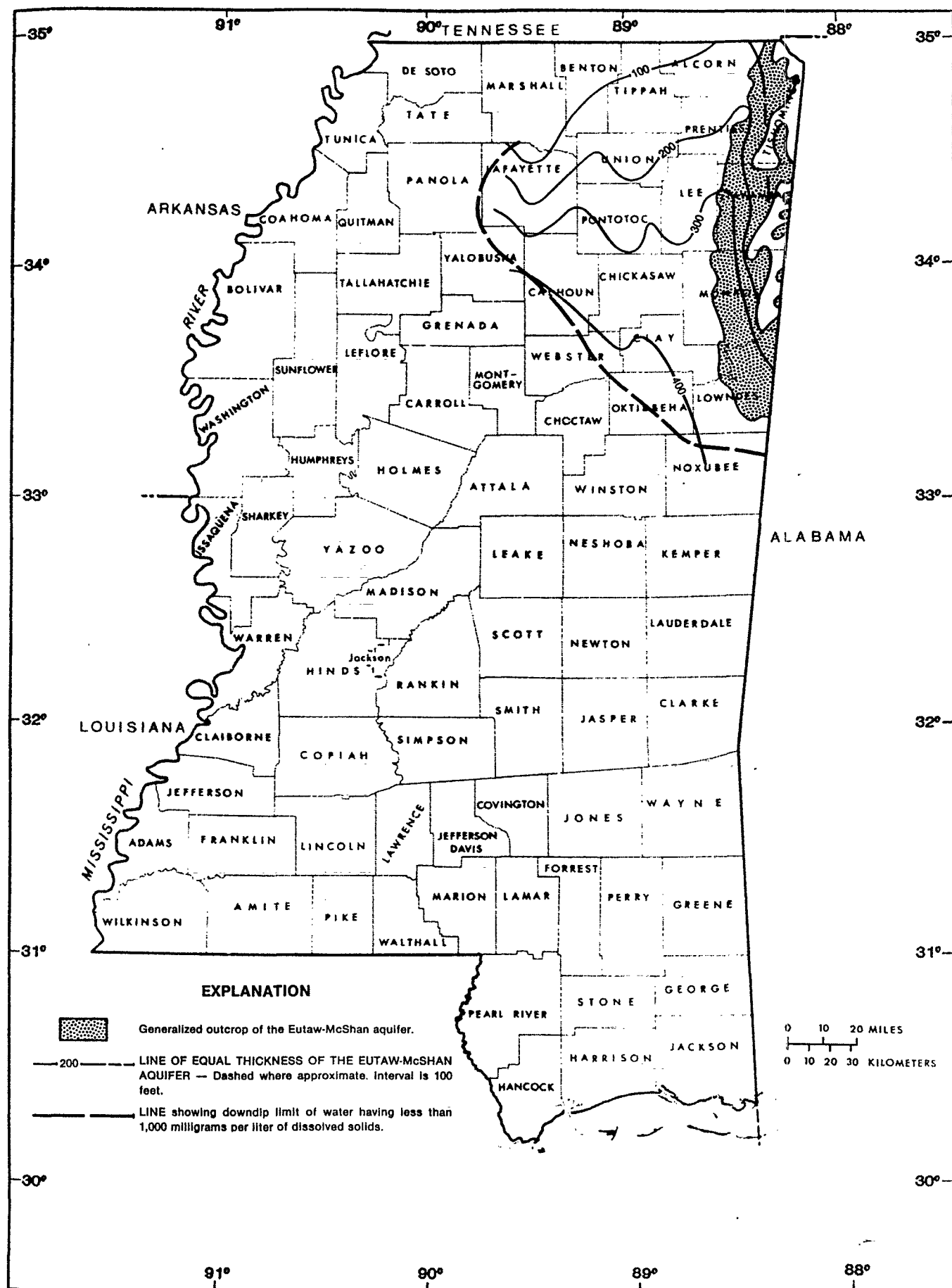


Figure 46. — Thickness of the Eutaw-McShan aquifer.

Transmissivities determined from 41 aquifer tests range from 200 to 4,900 ft²/d. Hydraulic conductivities average 13.4 ft/d and specific capacities average 3.3 (gal/min)/ft of drawdown (Boswell, 1977).

Large municipal wells in the Eutaw-McShan aquifer pump as much as 770 gal/min, but some produce under 100 gal/min. Continued development of the aquifers by large water users can be expected, but such development near areas of heavy pumpage such as Tupelo and West Point will aggravate the declining water-level problem in those areas. Large quantities of water are available where the underlying Tuscaloosa aquifers occur and these aquifers are frequently utilized rather than the Eutaw-McShan aquifer.

Water in the outcrop area is a hard, calcium-bicarbonate type having excessive iron. Further downdip the water becomes a sodium-bicarbonate type. Fluoride is prevalent throughout the aquifer. The downdip limits of fresh, slightly saline, and moderately saline water are shown in figure 44.

Bentonite, glauconite, and lignite are present in the outcrop area, and downdip from the 10,000 mg/L dissolved-solids zone some oil and gas is found.

The Eutaw-McShan aquifer is used to dispose of oil-field wastes downdip of the 10,000 mg/L dissolved-solids zone.

Tuscaloosa Aquifer System

The Tuscaloosa aquifer system consists of the Gordo and Coker Formations of the Tuscaloosa Group of Late Cretaceous age and the uppermost sands of the Lower Cretaceous rocks. The Gordo crops out along the eastern border of north Mississippi (fig. 48) and in northwest Alabama. The Coker crops out in northwestern Alabama. Structure contours on the base and top of the Gordo and the Coker aquifers are shown in figures 48 to 51. The formations dip to the southwest, steepening and thickening downdip (figs. 52 and 53). The Lower Cretaceous sands are as much as 200 feet thick in the southern part of the area. The formations thin and pinch out to the north, the deeper units disappearing first. The Coker pinches out to the north several miles before the Gordo pinches out.

The Gordo Formation is composed of an upper clay unit and a lower sand and gravel unit. The Coker consists of an upper unnamed member of mixed clay, sand, and gravel, and a basal massive sand that may be indistinguishable in places from the sand in the underlying Lower Cretaceous. The upper clay of the Gordo Formation serves to separate it somewhat from the overlying Eutaw-McShan aquifer, but the sands of the Lower Cretaceous may be in contact with Paleozoic aquifers.

The potentiometric surface of the Gordo aquifer (fig. 54) is similar to that of the Eutaw-McShan aquifer (fig. 47), because there is some leakage between the aquifers and because pumpage from the aquifers is similar. The water levels in the Tuscaloosa aquifer system are declining at about 2 ft/yr in much of the area with larger declines near Tupelo and Columbus. Water levels in the Coker are similar, but drawdowns have not been as large because the Coker is not heavily used.

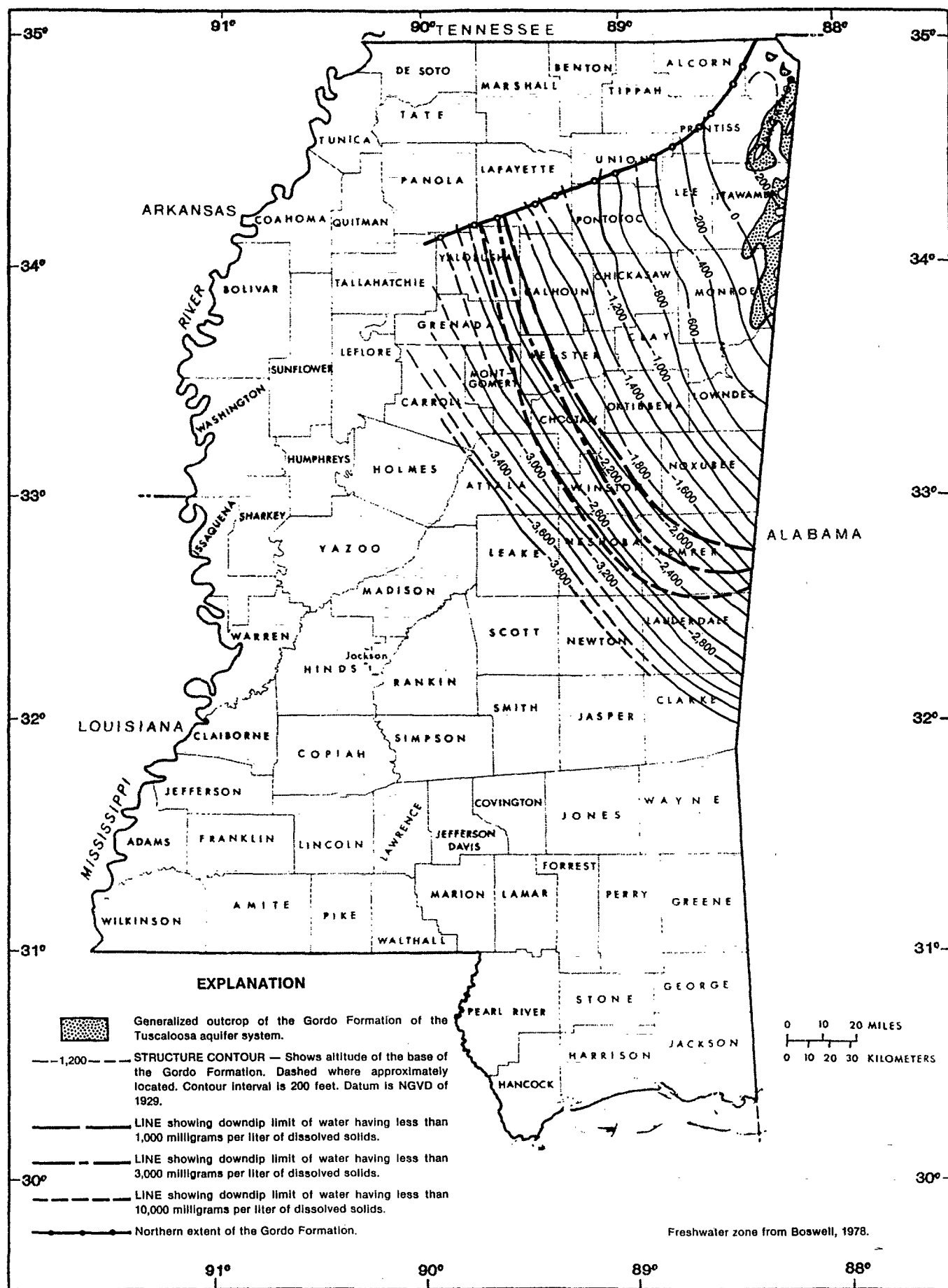


Figure 48. — Configuration of the base of the Gordo Formation of the Tuscaloosa aquifer system.

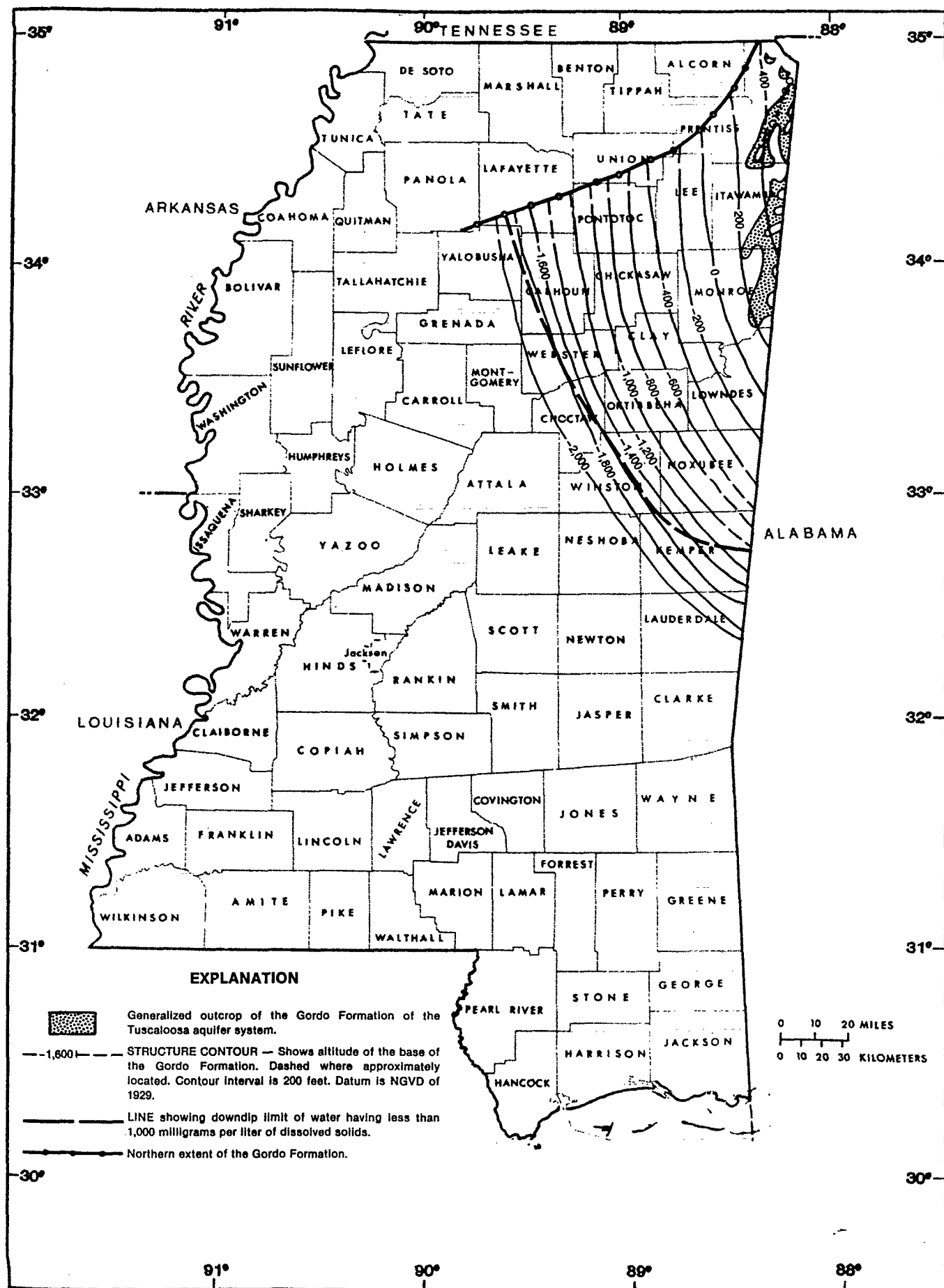


Figure 49. — Configuration of the top of the Gordo Formation of the Tuscaloosa aquifer system.

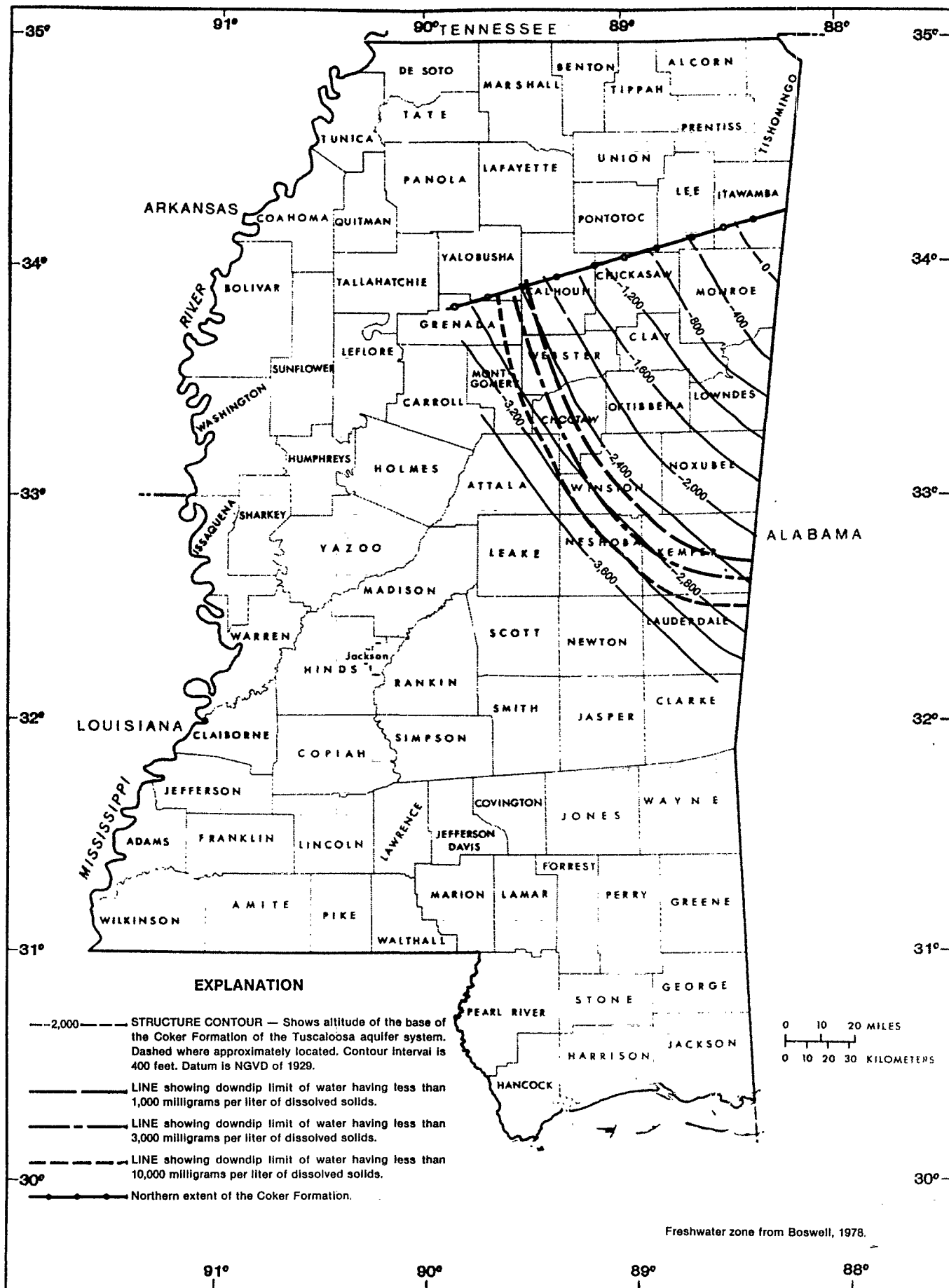


Figure 50. — Configuration of the base of the Coker Formation of the Tuscaloosa aquifer system.

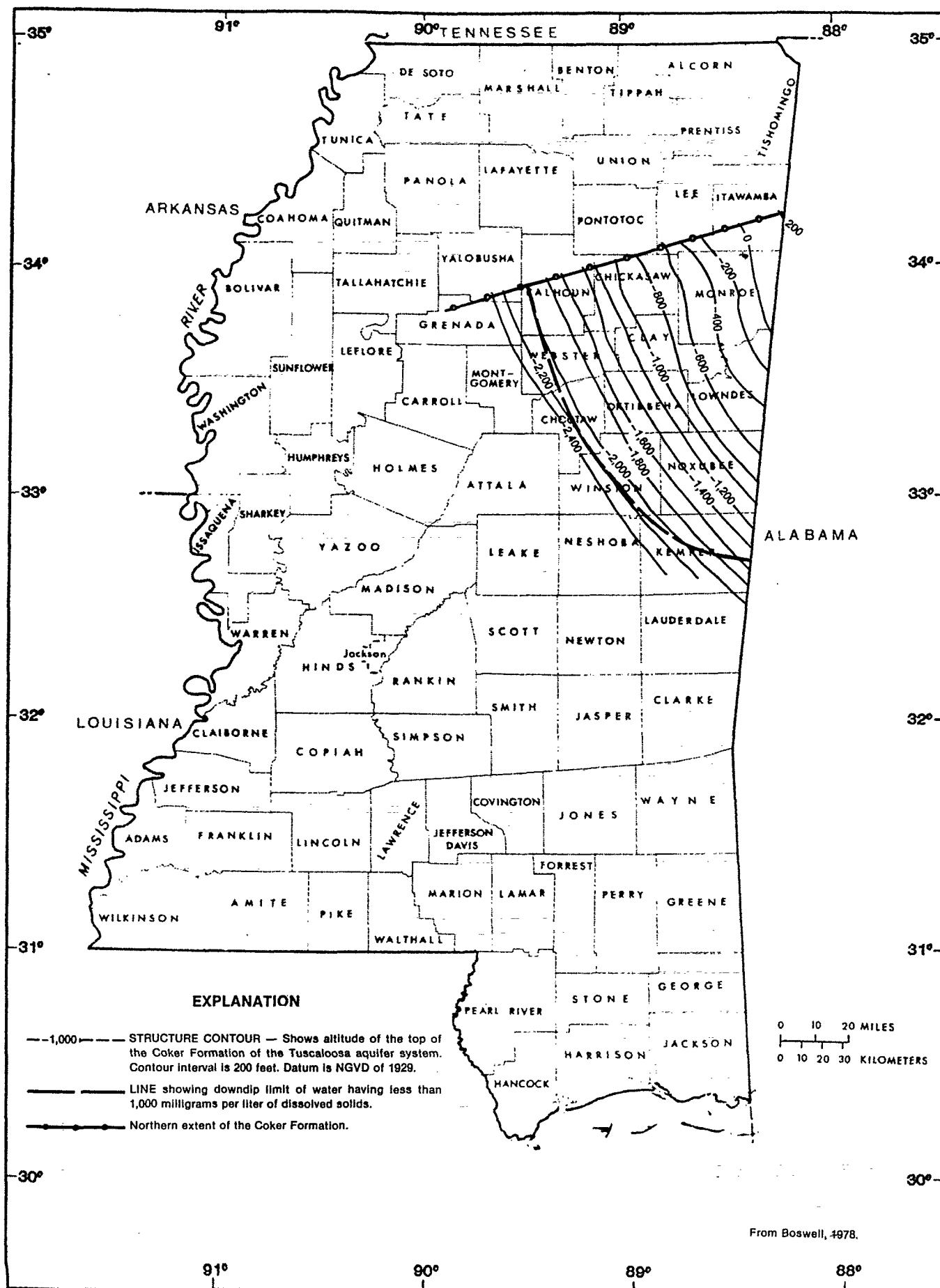


Figure 51. — Configuration of the top of the Coker Formation of the Tuscaloosa aquifer system.

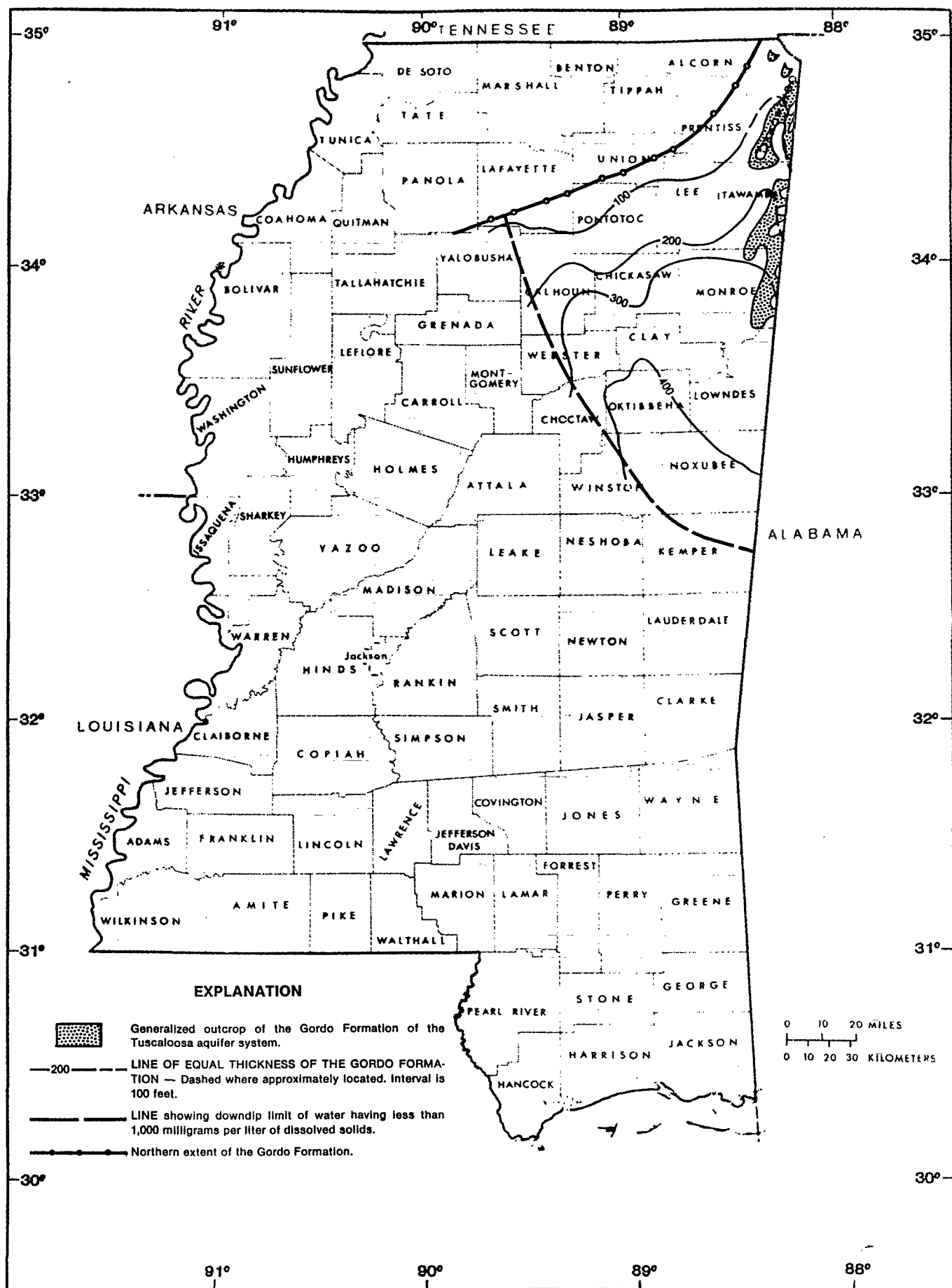


Figure 52. — Thickness of the Gordo Formation of the Tuscaloosa aquifer system.

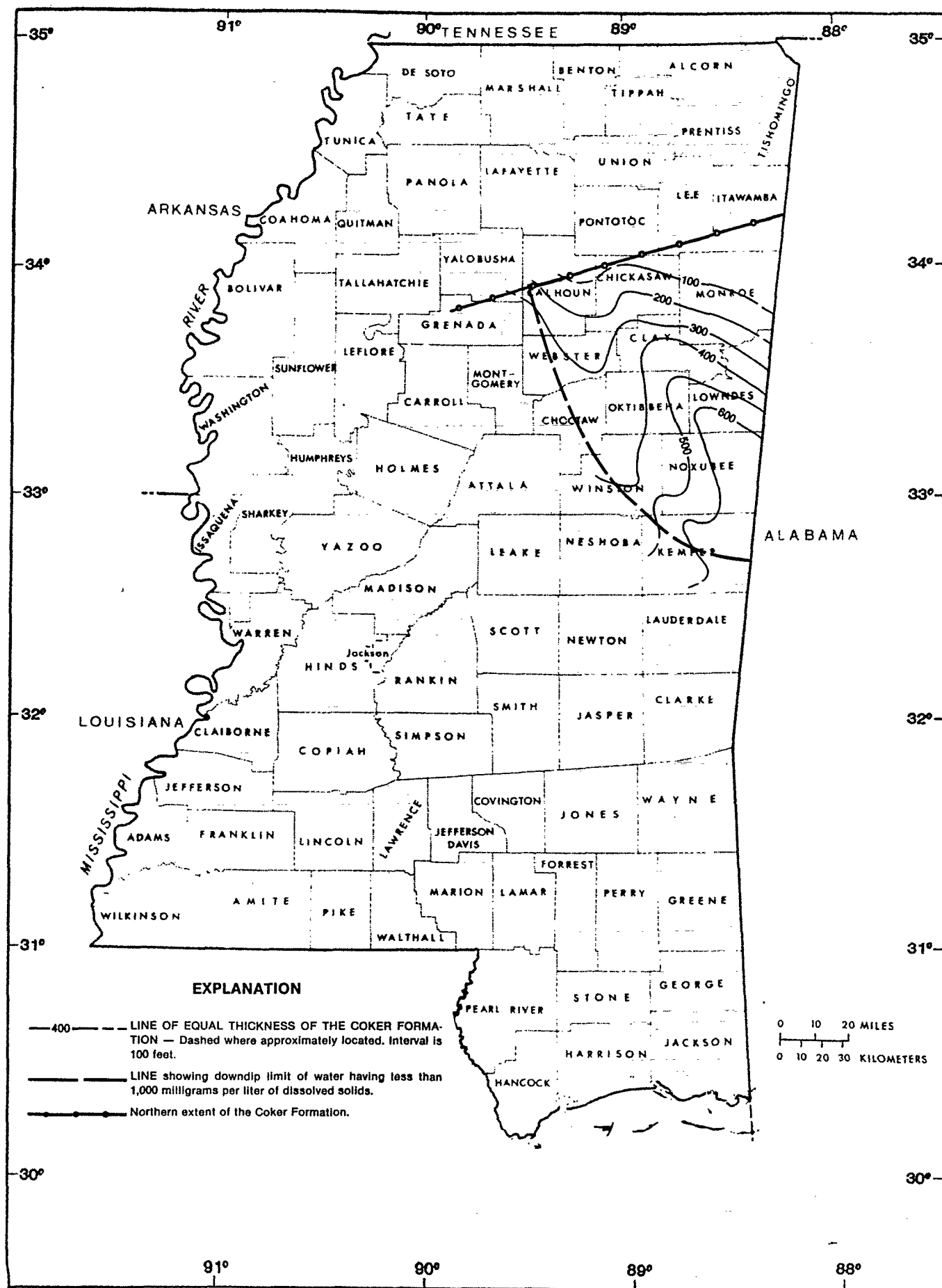


Figure 53. — Thickness of the Coker Formation of the Tuscaloosa aquifer system.

Recharge to the aquifers is from rainfall on the outcrop and infiltration from adjacent aquifers. Water movement is generally to the southwest, but is somewhat affected by pumpage.

Thirteen aquifer tests in the Gordo Formation indicate transmissivities of 535 to 21,400 ft²/d and an average hydraulic conductivity of 42.8 ft/d. Four aquifer tests in the Coker Formation indicate transmissivities ranging from 762 to 80,200 ft²/d (Boswell, 1978).

Large diameter wells in the Gordo commonly produce 500 to 1,000 gal/min and large wells in the Coker produce 1,500 to 1,800 gal/min. The Gordo Formation is more frequently utilized simply because it is shallower. Increased use of both formations can be expected in the future because water levels are high in most areas and well yields are large. The Coker may be used more extensively in the future in areas where the Gordo and the overlying Eutaw-McShan aquifer are being drawn down excessively.

Near the outcrops, water from the Tuscaloosa aquifers is clear, acidic, soft-to-slightly hard, low in dissolved-solids concentrations, and high in iron. The downdip limits of fresh, slightly saline, and moderately saline water are shown in figures 48 and 50.

Sand and gravel are mined from the outcrops of the Tuscaloosa aquifers, and lignite is found in the area. Oil and gas are produced in Clarke, Jasper, and Smith Counties and the area to the south and southwest of these counties.

Some oil field wastes are disposed of in the Tuscaloosa aquifers downdip from the 10,000 mg/L dissolved-solids limit.

Paleozoic Aquifer

The Paleozoic aquifer in northeastern Mississippi consists of the upper weathered zone of the Paleozoic rocks (fig. 55). The zone commonly is about 100 feet thick and was weathered prior to deposition of the overlying Cretaceous rocks. The weathered zone consists principally of limestone, chert, and sandstone. This zone varies in age across the aquifer, because the dip of the beds at 30 ft/mi is steeper than the dip of the weathered surface which dips at 17 to 30 ft/mi. The aquifer is not isolated from overlying Cretaceous aquifers.

The potentiometric surface of the Paleozoic aquifer (fig. 56) is similar to that of the overlying Eutaw-McShan (fig. 47) and Tuscaloosa aquifers (fig. 54). Near the outcrop, water levels are relatively stable. In the confined part of the aquifer, water-levels are lower and in some areas as much as 100 feet lower than that in the overlying aquifer. Water-level declines generally are greater than in the overlying aquifers. Near Corinth, the water level has declined at a rate of 9 to 15 ft/yr since 1962; elsewhere, the decline has been about 1 ft/yr. At current rates of withdrawal, it has been predicted by Wasson and Tharpe (1975) that water levels in the Corinth area will be drawn down to the top of the aquifer by 1987.



Roy F. Weston, Inc.
Suite 700
5599 San Felipe
Houston, Texas 77056-2721
713-621-1620 • Fax 713-621-6959

29 April 1997

Mr. Jim Tillman, P.E.
Mississippi Department of Environmental Quality
Office of Pollution Control
PO Box 10385
Jackson, MS 39289-0385

RE: Remediation Plan NRC-#329516
EOTT Energy Operating Limited Partnership
Pipeline Leak Site near Purvis, Mississippi

Dear Mr. Tillman:

This letter is in response to your letter dated 21 February 1997 addressing the Remediation Plan prepared by Roy F. Weston, Inc. (WESTON®) on behalf of EOTT Energy Operating Limited Partnership (EOTT). The Remediation Plan was prepared for a crude oil leak from a 10-inch gathering pipeline that occurred on property owned by Amerada Hess Corporation (Hess) near the inactive Purvis Mississippi refinery operated by Hess.

BACKGROUND

As part of an acquisition from Hess effective 1 January 1996, EOTT acquired a 10-inch crude oil pipeline that gathers oil from producers in the Holiday Creek field and transports it to EOTT Energy Pipeline Limited Partnership's Lumberton Station, 11 miles south of Hess's Purvis refinery. The pipeline transported crude oil in batches, approximately 3000 barrels twice a week at approximately 300 barrels per hour. Therefore, the pipeline was under pressure approximately 20 hours per week.

Approximately two month after the pipeline was acquired, a calculated shortage was noted during routine daily volumetric gain/loss calculations on the previous day's shipment. An aerial inspection was conducted of the pipeline from Holiday Creek to Lumberton Station on 1 March 1996. No visible leaks were noted from the inspection, so normal operations resumed. After the next shipment, a calculated shortage was again noted, so the pipeline sections were isolated, and an aerial inspection was conducted. Again, no visible leaks were noted from a second aerial inspection, therefore a ground inspection was initiated. On 5 March 1996 during the ground inspection, visual evidence of a release was discovered near the Hess owned Purvis refinery. Stained soils were noted in a drainage pathway outside the area of the refinery, but on contiguous property owned by Hess.



Mr. Jim Tillman, P.E.

29 April 1997

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EOTT notified the Mississippi Department of Environmental Quality and initiated a response action on 5 March 1996. Mr. Richard Ball of the MDEQ Emergency Response Group responded. The line was uncovered and the leak point identified. The leak occurred at the bottom of the carbon steel pipe at a low spot where internal corrosion had caused a pin hole leak. The pipeline was buried approximately three feet deep in accordance with DOT regulations. The response action included excavation of affected soils along the drainage pathway and affected soils around the pipeline leak. Approximately three barrels of crude oil were recovered from the excavation around the pipeline leak. Based on the visual extent of the leak, the amount released was initially estimated to be 15 to 20 barrels.

Affected soils were excavated down to approximately 22 feet below land surface in the area of the leak. Since it was not feasible to excavate all affected soils (the water table is 35 to 61 feet deep) the excavation was backfilled with clean soil with MDEQ approval. Affected soils were taken to EOTT's Lumberton Station where they could be managed within a diked area pending final resolution.

It was postulated that due to the nature of the sandy soils and the low viscosity of the crude oil, groundwater might have been affected. A drill rig was brought in and five borings were drilled; four borings reached groundwater. The four borings encountering groundwater were converted to 2-inch diameter PVC monitoring wells. Based on the revised amount of affected soils, the amount of crude oil released was now estimated to be approximately 500 barrels. A second phase investigation resulted in installation of seven additional wells to determine the horizontal extent of affected media. A third investigation involved cone penetrometer techniques (CPT) to determine stratigraphic information near the leak site, PSH recovery testing, and completion of a groundwater pumping test for possible remedial design. Wells were surveyed, water levels taken, and PSH levels measured to provide updated groundwater flow and PSH data.

A report was prepared and issued in October 1996, which was forwarded to MDEQ. After discussion with MDEQ, WESTON prepared a Remediation Plan that proposed recovery of PSH by vacuum enhanced (bioslurping) methods. The Remediation plan was reviewed by the RCRA Group of MDEQ and resulted in the letter request from MDEQ to WESTON dated 21 February 1997.

The remainder of this letter responds to the specific numbered requests.

1. **A vicinity map indicating the location of the area in question must be provided. Is it within or adjacent to the boundaries of the Purvis Refinery property, or is it located on an outlying parcel? Also, the map should depict**



Mr. Jim Tillman, P.E.

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adjacent property boundaries or indicate the distance to any adjoining properties.

Response. A more detailed map has been prepared and is attached to this letter as Figure 1. The spill occurred on Hess property but outside the active refinery area.

2. **Since the Remediation of this area is to occur under the provisions of HSWA, documentation that Amerada Hess has been in contact with EPA to determine all required activities are occurring within the scope of the HSWA requirements. The EPA contact for the site is Mr. Russ McLean; his telephone number is 404-562-8504. Copies of all previously submitted information should also be provided to EPA.**

Response. EOTT does not agree that this spill should be handled under the provisions of HSWA. The pipeline gathers produced crude oil from the Holiday Creek Field and transports it to EOTT's Lumberton Station. Further, the involvement of Amerada Hess is that of a property owner who has granted an easement across his property. As such, EOTT has duly notified Hess. A copy of this letter has been forwarded to both Hess and EPA. EOTT is concerned that PSH recovery action should be initiated as soon as possible to minimize the potential movement of the oil and reduce the contact time between oil and groundwater.

3. **"PSH" should be defined.**

Response. PSH is phase separated hydrocarbon. The remediation plan will be revised to note this.

4. **Please indicate how the "visually stained soils" that were excavated were managed on-site and the method of disposal for this material.**

Response. The "visually stained soils" were excavated by track hoe, loaded directly into dump trucks and trailers, and transported to the Lumberton Station, which is owned and operated by EOTT Energy Pipeline Limited Partnership. Approximately 700 cubic yards of soil were excavated and transported to the Lumberton Station. The soils are staged at the Station awaiting disposition as part of the remediation. EOTT would like to discuss the possibility of a petroleum affected soils treatment area at a central location in Mississippi where soils of this nature may be biologically treated until they meet the criteria to be no longer regulated. EOTT has received approval from other states, such as

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Texas, to operate such a facility. This allows for the routine, timely management of soils that may be affected by ongoing operation of a crude oil pipeline.

5. What criteria were used to determine that soil removal activities were adequate? Please provide results of any sampling that occurred.

Response. The criteria discussed at the site for TPH cleanup was 100 mg/kgm. Soils along the drainage pathway were removed based on visual contamination. Soil samples were collected from and around the excavation and submitted for TPH analysis. Surface soil samples were also collected from each of the monitoring well borings and submitted for TPH analysis. The excavation below the pipeline release point was known to remain affected, but the excavation was terminated due to equipment limitations and depth to groundwater. The results from the soil sampling activities are presented in Table 1.

6. Was it necessary to remove accumulated rainwater before the area of excavation was backfilled? If so, how was this water managed? It may also be necessary to collect surface soil samples around the excavation area to verify that no contamination resulted from runoff.

Response. Although at least one rainfall event occurred while the excavation was open, there were no events that resulted in rainfall accumulating in the excavation. Therefore, no rainwater was removed from the excavated area. Since soils affected by the release were within and near the bottom of the excavation (22 feet down), it seems reasonable that surface soils would not be affected. We would recommend that surficial soil samples to investigate the drainage pathway are not necessary.

7. While Figure 2 has the "estimated extent of affected groundwater" specifically marked, and notations at each well note the thickness of the PSH, neither are units noted nor is the estimated extent of PSH depicted. Statements on page 3 imply that this parameter is illustrated in the figure.

Response. We agree that this figure is not as well annotated as we would like. The legend notes the PSH contour interval is 0.5 feet. Therefore, each well's PSH thickness can be seen to correlate with contours shown to either side-one larger and one smaller than the listed value. The 0.0 contour therefore reflects the estimated extent of PSH and will be labeled as such. The dotted contour represents an estimate of affected groundwater that was added to Figure 2 for convenience and therefore labeled to distinguish it from the PSH contours.

Mr. Jim Tillman, P.E.

29 April 1997

Page 5

- 8. How was soil and development water generated by the installation of the monitoring wells managed? What materials were used in the construction of the wells, casings, etc.? The proposal indicates that five feet of well screening will be above the water table, but there is no indication as to how much screening will be below the water table. A well log for each well should be provided along with surveyed locations.**

Response. Soil generated from the installation of the existing monitoring wells was added to the excavated soils stockpiled at the Lumberton Station. Fluid generated from well installation was staged in drums, picked up by vacuum truck, and injected back into the pipeline. Attachment A contains a copy of all well logs that we have been able to locate. The existing monitoring well locations are shown in Figure 1.

For the proposed recovery wells, the screened interval will be constructed such that approximately five feet of screened interval will extend above the encountered water table and approximately 10 feet extend below the water table. While PSH recovery is the primary objective, this construction approach will allow for natural groundwater fluctuations and provide the ability to be used as groundwater recovery wells in the event that such is needed.

- 9. Please indicate how removed groundwater will be managed.**

Response. The proposed design is for recovery of PSH only. A small amount of groundwater may be removed with the PSH or separate once it is managed in drums on site. EOTT proposes to remove the recovered liquids (oil and water) by vacuum truck as required and inject them into the pipeline.

- 10. It is recommended that some form of secondary containment be provided for the containers.**

Response. We agree and it will be added so that the single largest container could be contained if spilled, plus 25% freeboard.

- 11. More detailed sampling of the perimeter wells should be performed to verify that the full extent of the plume has been defined. Routine sampling of these wells should also be proposed to document that the plume is not further migrating and/or plans provided for the extraction/remediation of the contaminated groundwater as well as a time frame for implementing this additional remediation.**



Mr. Jim Tillman, P.E.

29 April 1997

Page 6

Response. It is proposed that quarterly sampling of wells W-4, W-8, W-2A, W-5P, W-7P, W-9P, and W-10P be conducted. This routine sampling will occur for one year after initiation of PSH recovery. Wells will be analyzed for TPH and BTEX. At each quarterly event, all on-site wells will be measured for PSH. At that point, a recommendation will be made to MDEQ for continuation or revision of the sampling program. It is proposed that groundwater only be treated using the PSH recovery/bioslurping methodology proposed until such time as routine sampling indicates plume movement at concentrations not treatable by natural attenuation/passive biological treatment.

12. For the proposed recovery well system, what type of air emissions control devices will be used with product recovery?

Response. The containers used to store recovered PSH are anticipated to be 55-gallon drums venting to atmosphere. The breathing/loading losses of the crude oil were taken to be negligible; therefore, no air emissions controls were proposed for PSH containment. The vacuum blower proposed for enhanced PSH recovery is anticipated to be less than 300 standard cubic feet per hour (SCFH). Given this anticipated rate and the characteristics of the crude oil, it was also assumed that no emissions controls would be required. This is further supported since no receptors have been identified within 500 feet of the site. The closest receptor is the remaining employees at the inactive Purvis refinery approximately 1,100 feet away.

13. Additional general background information should be included, such as the depth of the pipeline. How was the release discovered? What appeared to be the cause of the leak? When was the line last inspected/tested for leaks? What is the average volume of crude oil flowing through this line?

Response. A more detailed background information section has been included at the beginning of this letter. Specific responses to the questions raised above are: (1) The pipeline is about 3 feet below grade, in accordance with DOT regulations, at the point of release. (2) The release was suspected when a calculated shortage was noted during routine daily volumetric gain/loss calculations on the previous day's shipment. (3) The leak occurred at the bottom of the pipe at a low spot where internal corrosion had caused a pin-hole sized leak. (4) A daily volumetric accounting is conducted on this pipeline system. Historical hydrostatic testing records on this section of pipeline were not transferred in the sale of assets from Hess. The line was repaired after the leak was discovered, temporarily taken out-of-service, and filled with nitrogen. The line was then



Mr. Jim Tillman, P.E.

29 April 1997

Page 7

hydrostatically tested on 11 October 1996 at 500 pounds per square inch (psi) for approximately 8.5 hours, and put back into service. (5) The line batch transfers average about 300 barrels per hour. At the time of the release, transfers of approximately 3000 barrels occurred approximately twice per week.

We hope this information assists you in your evaluation of our request. We are eager to install equipment to initiate PSH recovery for mitigating the potential for migration. We recently received our easement from Hess to access this site and are now in a position to aggressively move forward as soon as MDEQ authorizes our actions. Thank you for your prompt attention to this matter.

Yours very truly,

ROY F. WESTON, INC.

A handwritten signature in cursive script, reading "Thomas R. Marrou".

Thomas R. Marrou, P.E.

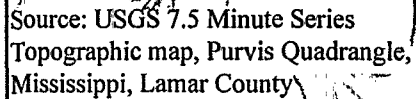
TRM/wds
Attachments

cc: ~~Mr. Louis Crawford, MDEQ~~
Mr. Russ McLean, EPA
Mr. Alex Sagebien, Amerada Hess
Ms. Anita Cuevas Smith, EOTT

TABLE 1
SUMMARY OF PREVIOUS SOIL TPH RESULTS

SAMPLE				LOCATION
DATE	NO.	RESULTS, (mg/kg)	DEPTH	
3/11/96	96311-01	192	6'	Southern portion of excavation
3/12/96	96312-01	13,560	7'	At same location as 96311-01
3/12/96	96312-02	ND	24"-30"	Composite of 4 samples to establish background
3/14/96	96314-01	ND	12'	At same location as 96311-01
3/14/96	96314-02	ND	6'	Southern portion of excavation
3/20/96	96320-01	9380	Surface	Eastern portion of excavation
3/20/96	96320-02	5180	Surface	Southeastern portion of excavation
3/20/96	96320-03	1504	Surface	Approx 93' east of excavation area
3/20/96	96320-04	ND	20'	Approx 10' east of excavation area
3/20/96	96320-05	ND	20'	Approx 43' east of excavation area
5/9/96	Hole #1	276	0-2'	At Well #1
5/13/96	Hole #2	709	0-2'	At Well #2
5/15/96	Hole #2A	1800	0-2'	At Well #2A
5/14/96	Hole #3	ND	0-2'	At Well #3
5/17/96	Hole #4	114	0-2'	At Well #4
6/14/96	Hole #8	255	0-2'	At Well #8

ND = Not Detected



ATTACHMENT A
MONITORING WELL LOGS



Bonner Analytical Testing Company

2703 Oak Grove Road, Hattiesburg MS 39402
Phone: (601)264-2854 Fax: (601)268-7084

MONITORING WELL CONSTRUCTION DIAGRAM

Driller Permit # 0-531
Client: EOTT Energy
Address:

Boring No.: Well #4
Date Started: 05/16/96
Date Finished: 05/17/96

Surface Elevation:
L3/Top of Casing: 1 ft.
Well Installed on Completion: YES
(This is a temporary exploratory well)

KEY:
Well Design Concrete Grout Bentonite Seal Sand Pack Screen

Lithologic Description	Depth (Feet)	Well Design	Sampling Method	Well Loc.: Lamar County Section: Township: Range: Well Usage: Temporary delineation monitoring well	Development Method
CL soil - LB color - medium stiff	0.0				<input checked="" type="checkbox"/> Bailer <input type="checkbox"/> Airlift <input type="checkbox"/> Nitrogen <input type="checkbox"/> Submersible Pump <input type="checkbox"/> Other
	5.0				
SP soil - LB color - soft	10.0				Well Dev. Time: 30 min. Volume: 4.1 Gal.
	15.0				
	20.0				
	25.0				
	30.0				
	35.0				
SP soil - LB color - soft				WELL CONSTRUCTION MATERIALS: PROTECTIVE COVER: <input type="checkbox"/> Manhole <input type="checkbox"/> Protective Casing <input checked="" type="checkbox"/> Other: NONE RISER MATERIAL: PVC WELL DIAMETER: 2 in. SCREEN MATERIAL: PVC SCREEN SLOT SIZE: <input checked="" type="checkbox"/> 0.010 <input type="checkbox"/> 0.020 BENTONITE PLUG <input type="checkbox"/> GROUT <input type="checkbox"/> SAND: Quantity: <u>6</u> Bags @ <u>80</u> lbs ea INITIAL WATER LEVEL <u>61.0</u> ft. WATER LEVEL AT DEVELOPMENT: <u>61.5.0</u> ft.	

Sampling Method
☒ Auger ☐ Spillspoon ☐ Shelby Tube ☐ Bailer



Bonner Analytical Testing Company

2703 Oak Grove Road, Hattiesburg MS 39402
Phone: (601)264-2854 Fax: (601)268-7084








MONITORING WELL CONSTRUCTION DIAGRAM





Driller Permit # 0-631
Client: EOTT Energy
Address:

Boring No.: Well #4
Date Started: 05/16/96
Date Finished: 05/17/96

Surface Elevation:
LS/Top of Casing: 1 ft.
Well Installed on Completion: YES
(This is a temporary exploratory well)

KEY
Well Design  Concrete  Grout  Bentonite Seal  Sand Pack  Screen

Lithologic Description	Depth (Feet)	Well Design	sampling level /method	Lithologic Description	Depth (Feet)	Well Design	sampling level
SP soil - LB color - soft	35.0				70.0		
	40.0				75.0		
	45.0				80.0		
	50.0				85.0		
	55.0				90.0		
	60.0				95.0		
WATER	65.0				100.0		
	70.0				105.0		

Sampling Method
 Auger  Spoon  Shelby Tube  Bailer



Bonner Analytical Testing Company

2703 Oak Grove Road, Hattiesburg MS 39402
Phone: (601)264-2854 Fax: (601)268-7084

MONITORING WELL CONSTRUCTION DIAGRAM

Driller Permit # 0-531
Client: EOTT Energy
Address:

Boring No.: Well #2-A
Date Started: 05/14/96
Date Finished: 05/15/96

Surface Elevation:
LS/Top of Casing: 1 ft.
Well Installed on Completion: YES
(This is a temporary exploratory well)

KEY:
Well Design Concrete Grout Bentonite Seal Sand Pack Screen

Lithologic Description	Depth (Feet)	Well Design	Sampling level	Well Loc.: Lamar County Section: Township: Range: Well Usage: Temporary delineation monitoring well	Development Method
Dark Brown CL soil - color - medium stiff	0.0				<input checked="" type="checkbox"/> Bailer <input type="checkbox"/> Airlift <input type="checkbox"/> Nitrogen <input type="checkbox"/> Submersible Pump <input type="checkbox"/> Other Well Dev. Time: 35 min. Volume: 5 Gal.
	5.0				
	10.0				
SC soil- LB color - Soft	15.0				
	20.0			WELL CONSTRUCTION MATERIALS: PROTECTIVE COVER: <input type="checkbox"/> Manhole <input type="checkbox"/> Protective Casing <input checked="" type="checkbox"/> Other: NONE RISER MATERIAL: PVC WELL DIAMETER: 2 in. SCREEN MATERIAL: PVC SCREEN SLOT SIZE: <input checked="" type="checkbox"/> 0.010 <input type="checkbox"/> 0.020 BENTONITE PLUG <input type="checkbox"/> GROUT <input type="checkbox"/> SAND: Quantity: <u>6</u> Bags @ <u>80</u> lbs ea INITIAL WATER LEVEL 50.0 ft. WATER LEVEL AT DEVELOPMENT: 52.5 ft.	
SP soil	25.0				
	30.0				
Medium Stiff	35.0				
SP soil - LB color - Medium Stiff					

Sampling Method
☒ Auger ☐ Spitspoon ☐ Shelby Tube ☐ Bailer



Bonner Analytical Testing Company

2703 Oak Grove Road, Hattiesburg MS 39402
Phone: (601)264-2854 Fax: (601)268-7084










MONITORING WELL CONSTRUCTION DIAGRAM

Driller Permit # 0-531
Client: EOTT Energy
Address:

Boring No.: Well #2-A
Date Started: 05/14/96
Date Finished: 05/15/96

Surface Elevation:
LS/Top of Casing: 1 ft.
Well Installed on Completion: YES
(This is a temporary exploratory well)

KEY:
Well Design  Concrete  Grout  Bentonite Seal  Sand Pack  Screen

Lithologic Description	Depth (Feet)	Well Design	sampling level /method	Lithologic Description	Depth (Feet)	Well Design	sampling level
LB to Red SP soil - color - Medium Stiff	35.0				70.0		
							
	40.0				75.0		
Dark Gray CL soil - color - Stiff							
							
SP soil - LB color - soft	45.0				80.0		
							
							
	50.0				85.0		
					90.0		
WATER	55.0						
	60.0				95.0		
	65.0				100.0		
	70.0				105.0		

Sampling Method
☒ Auger ☐ Split spoon ☐ Shelby Tube ☐ Bailer



Bonner Analytical Testing Company

2703 Oak Grove Road, Hattiesburg MS 39402
Phone: (601)264-2854 Fax: (601)268-7084










MONITORING WELL CONSTRUCTION DIAGRAM

Driller Permit # 0-531
Client: EOTT Energy
Address:

Boring No.: Well #3
Date Started: 05/13/96
Date Finished: 05/14/96

Surface Elevation:
LS/Top of Casing: 1 ft.
Well installed on Completion: YES
(This is a temporary exploratory well)

KEY:
Well Design  Concrete  Grout  Bentonite Seal  Sand Pack  Screen

Lithologic Description	Depth (Feet)	Well Design	Sampling level	Well Loc.: Lamar County Section: Township: Range: Well Usage: Temporary delineation monitoring well	Development Method
Dark Brown CL soil - color - medium stiff	0.0			<p><input checked="" type="checkbox"/> Bailer <input type="checkbox"/> Airlift <input type="checkbox"/> Nitrogen <input type="checkbox"/> Submersible Pump <input type="checkbox"/> Other</p> <p>Well Dev. Time: 30 min. Volume: 4 Gal.</p>	
	5.0				
	10.0				
SC soil- YO color - Soft	15.0				
	20.0			<p>WELL CONSTRUCTION MATERIALS:</p> <p>PROTECTIVE COVER: <input type="checkbox"/> Manhole <input type="checkbox"/> Protective Casing <input checked="" type="checkbox"/> Other: NONE</p> <p>RISER MATERIAL: PVC</p> <p>WELL DIAMETER: 2 in.</p> <p>SCREEN MATERIAL: PVC</p> <p>SCREEN SLOT SIZE: <input checked="" type="checkbox"/> 0.010 <input type="checkbox"/> 0.020</p> <p>BENTONITE PLUG <input type="checkbox"/> GROUT <input type="checkbox"/></p> <p>SAND: Quantity: <u>6</u> Bags @ <u>80</u> lbs ea</p> <p>INITIAL WATER LEVEL <u>35.5</u> ft</p> <p>WATER LEVEL AT DEVELOPMENT: <u>35.56</u> ft</p>	
CL soil - LB color - Medium Stiff	25.0				
	30.0				
	35.0				
WATER	40.0				

Sampling Method
☒ Auger ☐ Spitspoon ☐ Shelby Tube Bailer



Bonner Analytical Testing Company

2703 Oak Grove Road, Hattiesburg MS 39402
Phone: (601)264-2854 Fax: (601)268-7084

MONITORING WELL CONSTRUCTION DIAGRAM

Driller Permit # 0-531
Client: EOTT Energy
Address:

Boring No.: Well #1
Date Started: 05/08/98
Date Finished: 05/10/98

Surface Elevation:
LS/Top of Casing: 1 ft.
Well Installed on Completion: YES
(This is a temporary exploratory well)

KEY:
Well Design Concrete Grout Bentonite Seal Sand Pack Screen

Lithologic Description	Depth (Feet)	Well Design	Sampling Method	Well Loc.: Lamar County Section: Township: Range: Well Usage: Temporary delineation monitoring well	Development Method
CL soil - LB color - medium stiff	0.0			<p><input checked="" type="checkbox"/> Bailer <input type="checkbox"/> Airlift <input type="checkbox"/> Nitrogen <input type="checkbox"/> Submersible Pump <input type="checkbox"/> Other</p> <p>Well Dev. Time: 35 min. Volume: 5 Gal.</p>	
	5.0				
	10.0				
	15.0				
Soft				<p>WELL CONSTRUCTION MATERIALS:</p> <p>PROTECTIVE COVER: <input type="checkbox"/> Manhole <input type="checkbox"/> Protective Casing <input checked="" type="checkbox"/> Other: NONE</p> <p>RISER MATERIAL: PVC</p> <p>WELL DIAMETER: 2 in.</p> <p>SCREEN MATERIAL: PVC</p> <p>SCREEN SLOT SIZE: <input checked="" type="checkbox"/> 0.010 <input type="checkbox"/> 0.020</p> <p>BENTONITE PLUG <input type="checkbox"/> GROUT <input type="checkbox"/></p> <p>SAND: Quantity: <u>6</u> Bags @ <u>80</u> lbs ea</p> <p>INITIAL WATER LEVEL 56.25 ft.</p> <p>WATER LEVEL AT DEVELOPMENT: 54.0 ft.</p>	
SC soil	20.0				
	25.0				
	30.0				
	35.0				
SC soil - LB color - soft					

Sampling Method
☒ Auger ☐ Splitspoon ☐ Shelby Tube ☐ Bailer



Bonner Analytical Testing Company

2703 Oak Grove Road, Hattiesburg MS 39402
Phone: (601)264-2854 Fax: (601)268-7084






MONITORING WELL CONSTRUCTION DIAGRAM





Driller Permit # 0-531
Client: EOTT Energy
Address:

Boring No.: Well #1
Date Started: 05/09/96
Date Finished: 05/10/96

Surface Elevation:
LS/Top of Casing:
Well installed on Completion: YES
(This is a temporary exploratory well)

KEY:
Well Design  Concrete  Grout  Bentonite Seal  Sand Pack  Screen

Lithologic Description	Depth (Feet)	Well Design	sampling level /method	Lithologic Description	Depth (Feet)	Well Design	sampling level
SC soil - LB color - soft	35.0				70.0		
	40.0				75.0		
SP soil	45.0				80.0		
	50.0				85.0		
	55.0				90.0		
WATER					95.0		
	60.0						
	65.0				100.0		
					0		
	70.0				105.0		

Sampling Method
 Auger  Split spoon  Shelby Tube  Bailer



STATE OF MISSISSIPPI
DEPARTMENT OF ENVIRONMENTAL QUALITY
JAMES I. PALMER, JR.
EXECUTIVE DIRECTOR

May 14, 1997

RECEIVED
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MAY 22 10 05 AM '97
COMPLIANCE SECTION

Certified Mail Z 156 165 144

Bill Godard
The Headrick Companies
P. O. Drawer 4407
Laurel, MS 39441

Dear Mr. Godard:

Enclosed please find our inspection report that was completed as a result of a Compliance Evaluation Inspection (CEI) at Headrick Sign Company on May 6, 1997. This inspection revealed that the facility was in violation of the following Mississippi Hazardous Waste Management Regulation (MHWMR):

262.40(a) the generator must maintain a copy of the manifest signed by the transporter for three years or until a signed copy is received from the designated treatment, storage, or disposal facility. The signed copy must be retained for three years from the date the waste was accepted by the initial transporter.

262.34(d)(2) containers holding hazardous waste must always be closed during storage except when waste is added or removed.

We request that you respond to these alleged violations within ten days of receipt of this letter. This response should contain: (1) actions that have been taken to correct the violation. (2) reasons that you believe the alleged violations did not exist. The Office of Pollution Control will review this information before determining if further action is warranted. Failure to submit this information may result in enforcement action.

If you have any questions, do not hesitate to contact me at (601) 961-5195.

Sincerely,

A handwritten signature in cursive script, appearing to read "Mohammad Yassin".

Mohammad Yassin

RCRA INSPECTION

1. Inspector and Author of Report

Mohammad Yassin

Mississippi Department of Environmental Quality (MSDEQ)

Office of Pollution Control (OPC)

2. Facility Information

Headrick Sign Company

1117 W 8th Street

Laurel, Mississippi 39440

3. Responsible Company Official

Mr. Garland Miles, Production Manager

4. Inspection Participants

Bill Godard - Headrick Sign Company

Mohammad Yassin - MSDEQ

5. Date and Time of Inspection

May 6, 1997 - 1:15 pm

6. Applicable Regulation

Mississippi Hazardous Waste Management Regulation (MHWMR)

MHWMR 262

MHWMR 263

MHWMR 265

MHWMR 268

7. Purpose of Inspection

Ensure facility's compliance with MHWMR.

8. Facility Description

Headrick Sign Company (HSC) manufactures business signs such as gas station signs, convenient store signs, and others. It is located on 8th street, in Laurel, Jones county, Mississippi. It is approximately five acres in size with unrestricted access. The manufacturing process consists of cutting, welding, sand blasting, and painting. The following are on site: cutting and welding area, painting area, blasting area, offices, drilling and cutting equipment, pipes, valves, communication system (telephone), and fire extinguishers. The principal hazardous waste generated and managed at the facility are paint related materials.

HSC operates and manages one accumulation/storage area. It is located in the painting area over 75 feet from the property line. It consists of a concrete floor and 55-gallon drums.

9. Finding

Based on the facility's manifests (1994 - present), it was determined that the facility generated paint related materials. These wastes were transported by; Four Way Tank, and PWI Inc. They were shipped to; Essex Waste Management, and Chief Supply Corporation. No deficiencies were found in the facility's land disposal restrictions and annual reports. Manifest number 02960-0002, dated 11-5-96, did not have the original manifest, which must be signed by the designated facility. This manifest was taged and shown to Mr. Godard during the inspection for future references.

At the time of this inspection one 55-gallon drum was used to store hazardous waste in the accumulation/storage area. The drum was labeled flammable liquid and its bung was opened.

10. Conclusion

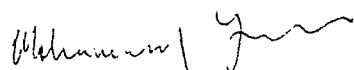
This inspection revealed that the facility is in violation of the following MHWMR;

262.40(a) the generator must maintain a copy of the manifest signed by the transporter for three years or until a signed copy is received from the designated treatment, storage, or disposal facility. The signed copy must be retained for three years from the date the waste was accepted by the initial transporter.

262.34(d)(2) containers holding hazardous waste must always be closed during storage except when waste is added or removed.

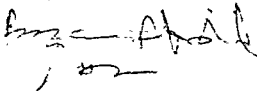
RSC is designated as a small quantity generator for the year 1997.

11. Prepared and Signed by;



Mohammad Yassin
Environmental Engineer, PE

12. Approved by;



David Lee
RCRA Coordinator



STATE OF MISSISSIPPI
DEPARTMENT OF ENVIRONMENTAL QUALITY
JAMES I. PALMER, JR.
EXECUTIVE DIRECTOR

May 13, 1997

RECEIVED
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MAY 22 10 01 AM '97
COMM-FBI

CERTIFIED MAIL Z 389 969 566

Mr. Todd Ainsworth
Branch Manager
Sherwin-williams
8955 1st Industrial Drive
Southaven, Mississippi 38671

Dear Mr. Ainsworth:

Re: Sherwin-williams
8955 1st Industrial Drive
Southaven, Mississippi

Enclosed please find an inspection report that was completed as a result of a RCRA inspection at Sherwin-williams on April 29, 1997. This inspection revealed the following apparent violations of the Mississippi Hazardous Waste Management Regulations (MHWMR).

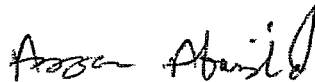
1. MHWMR 262.34 (c) (1) (I) /265.173 (a): A container holding hazardous waste must always be closed during storage, unless adding it is necessary or remove waste. No waste was being added at the time of the inspection.
2. MHWMR 262.34 (a) (2): The date upon which each period of accumulation begins is clearly marked and visible for inspection on each month.

We request that you respond to these apparent violations within 10 days of receipt of this letter. This response should contain: (1) actions taken to correct the violations. (2) schedules for correcting the violations, or (3) reasons that you believe the alleged violations did not exist. The alleged violations may require a penalty, including a multi day penalty, under the RCRA Penalty Policy and should be corrected immediately; however, the Office of Pollution Control will review this information before determining if further action including a penalty is warranted.

Section 17-17-29 of the Mississippi Code Annotated (Supp. 1991) allows assessments of penalties not more than \$25,000 per day per violation. Failure to submit this information may result in enforcement action.

If you have any questions, do not hesitate to contact me at (601) 961-5171.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Azzam Abu-mirshid".

Azzam Abu-mirshid
Hazardous Waste Division
RCRA Generator Section

AA:hd

Enclosures

cc: Mr. James S. Kutzman, The EPA

RCRA INSPECTION REPORT

1. Inspector and Author of Report

Azzam Abumirshid
Mississippi Department of Environmental Quality - MDEQ
Office of Pollution Control

2. Facility Information

Sherwin-Williams - MSR000001800
8955 1st. Industrial Drive
Southaven, Mississippi 38671

3. Responsible Company Official

Mr. Todd Ainsworth
Branch Manager

4. Inspection Participants

Azzam Abumirshid - MDEQ
Todd Ainsworth - Sherwin-Williams
Christy Morris - Sherwin-Williams

5. Date and Time of Inspections

April 29, 1997 @ 10:30 a.m.

6. Applicable Regulations

Mississippi Hazardous Waste Management Regulations (MHWMR) 261, 262, 265.16, 265 subparts c, d and I and 268.

7. Purpose of Inspection

Compliance Evaluation Inspection (CEI) to determine facility's compliance with the applicable MHWMR.

8. Facility Description

Sherwin-Williams blends paint for several manufacturers such as furniture, grill, computeretc. Facility uses several vats for blending of paint. Facility generates approximately five 55 gallon drums of waste paint thinner (D001, F003, Foo5) per calendar month. waste is accumulated in 55 gallon drums in the blending room. When the drum is full it is transferred to the 90 day storage area in the room next to the blending room.

9. Findings

Facility was established in September of 1995. Facility generates greater than 220 but less than 2200 pounds of hazardous waste per calendar month. Therefore, it is a Small Quantity Generator (SQG). However, the facility notified as a Large Quantity Generator (LQG). Therefore, it is subject to the (LQG) requirements.

Satellite Accumulation Area:

There was one 55 gallon drum in this area. The drum was labeled, in good condition, grounded but has an open funnel.

90 day storage Area:

There were five 55 gallon drums in this area. The drums were in good condition, closed and labeled. Two of the drums were not marked with the accumulation starting date.

Manifest and land ban notification Records:

Facility's manifest and land ban notification records were prepared and maintained in the facility's file and were in compliance with the MHWMR.

Employee Training Records:

Employee training records were in compliance with the MHWMR. The following items were covered in the training program:

1. protective equipments
2. Waste handling, labeling, transferring waste to the 90 day storage area.
3. Paint mixing.
4. Communication and alarm system.
5. Spill and fire prevention.
6. Hazardous waste generator requirements.
7. Waste identification.
8. waste minimization and house keeping.
9. Contingency plan.

Contingency Plan:

A copy of the contingency plan is kept in the facility's files. The plan is in compliance with the MHWMR. Fire and police departments are aware of the possible hazardous conditions at the facility. All Material Safety Data Sheets (MSDS) are kept and reviewed by facility personnel.

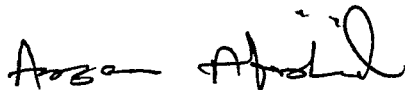
10. Conclusions

Sherwin-Williams is in violation of the following MHWMR:

1. MHWMR 262.34(c)(1)(I)/265.173(a): A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste.
No waste was being added at the time of the inspection.

2. MHWMR 262.34(a)(2): The date upon which each period of accumulation begins is clearly marked and visible for inspection on each container.

11. Signed



Azzam Abumirshid

12. Approval



David E. Lee

cc: Mr. G. Alan Farmer, EPA

RECEIVED
EPA/REGION IV

MAY 22 10 05 AM '97

May 9, 1997

HAZARDOUS RANKING SYSTEM PRELIMINARY SCORE

for

DELTA BRICK

MSD985975473

MACON, NOXUBEE COUNTY, MISSISSIPPI

Waste Characteristics

A hazardous waste quantity of 10 was assigned and used for the groundwater, surface water, and the soil pathways. The air pathway was not scored. This value was based on the most conservative estimate using an estimated volume of 231,222.22 cubic yards of contaminated soil.

Groundwater

The groundwater pathway was evaluated on a potential to release to the near surface groundwater. No analytical data is present to document contamination of the Eutaw-McShan aquifer system.

Surface Water

The surface water pathway was scored on potential to release. The nearest perennial water body is a slough located about 150 feet to the west.

Soil

The soil pathway was evaluated on likelihood of exposure. Analytical data is present to document contamination on the premises.

Air

The air pathway was not evaluated.

Facility score = 7.4479

Sgw = 0.4182

Ssw = 14.8802

Sse = 0.54

Sa = Not scored

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 1 OF 1

FILE _____

APPN _____

DATE May 9, 1997

BY John M. Andrews

SUBJECT Delta Brick
Macon, Noxubee County, MS

CALCULATION OF H.R.S. SCORE

Pathway	Release	Score	Score ²
Groundwater Pathway Score	Potential.	0.4182	0.1749
Surface Water Pathway Score	Potential.	14.8802	221.4204
Soil Exposure Pathway Score	Likelihood of exposure.	0.54	0.2916
Air Migration Pathway Score	Not Scored.	—	—
		Total	221.8869

$$\text{Facility Score} = \sqrt{\frac{221.8869}{4}}$$

$$\text{Facility Score} = \underline{\underline{\underline{7.4479}}}$$

ENGINEERING CHART

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta BrickGROUNDWATER MIGRATION PATHWAY SCORESHEETAquifer - EUTAW - McShanLikelihood of Release to an Aquifer1. Observed Releaseobserved release to the groundwater2. Potential to Release2a. ContainmentTable 3-2Federal Register Vol. 55 No. 241 Dec. 14, 1990 pg. 51,59610Table 3-2 Source: All sources - No liner2b. Net PrecipitationAnnual precipitation - 52 (ref 8)Annual lake evaporation - 42 (ref 15)Net precipitation - 10 inchesTable 3-432c. Depth to AquiferAquifer depth - > 250Contamination depth - 0Table 3-5 > 25012d. Travel TimeTable 3-6 clay in piles had hydraulic conductivities of 10^{-8} + 10^{-9} Table 3-71

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick2e. Potential to Release

[lines 2a (2b + 2c + 2d)]

$$10(3 + 1 + 1)$$

503. Likelihood of Release

(higher of lines 1 and 2e)

50Waste Characteristics4. Toxicity/Mobility

substance	G.W. Mobility H.S.R.	Toxicity H.S.R.	Tox/mob Tab. 3-9
lead	1×10^{-2}	10,000	100

Highest Value

1005. Hazardous Waste quantityTable 2-5; Tier C; contaminated soil
(see back for calculation of volume)

$$6,243,000 \text{ ft}^3 \left(\frac{1 \text{ yd}^3}{27 \text{ ft}^3} \right) / 2,500 = 92.49$$

Table 2-6

para. 2.4.2.2

Default value

106. Waste Characteristics

$$\text{Tox/Mob} \times \text{Hazardous Waste Quantity}$$

$$(1 \times 10^{-2}) \times (1 \times 10^3) = 1 \times 10^1$$

Table 2-7

6

Pile	$\frac{L \times W \times h}{230 \times 130 \times 30}$	=	Volume
A.	$230 \times 130 \times 30$	=	<u>897,000 ft³</u>
B.	$230 \times 180 \times 30$	=	1,242,000 ft ³
C.	$300 \times 200 \times 30$	=	1,800,000 ft ³
D.	$250 \times 120 \times 30$	=	900,000 ft ³
E.	$190 \times 70 \times 30$	=	399,000 ft ³
F.	$270 \times 80 \times 30$	=	648,000 ft ³
G.	$170 \times 70 \times 30$	=	$\frac{357,000 \text{ ft}^3}{6,243,000 \text{ ft}^3}$

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 3 OF 15

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT

Delta Brick

7. Nearest Well

Private well N002 is located 0.625 mile SW of facility

Table 3-11 Greater than $\frac{1}{2}$ to 1.

9

8. Population

8a. Level I Concentrations

0

8b. Level II Concentrations

0

8c. Potential Contamination

Distance miles(s)	# Home Wells	# Public Wells	# Public Well Conn.	Total Popul.	Value Tab. 3-12	Connections
0 - $\frac{1}{4}$	-	-	-	-	-	A. Macon $\frac{1064}{3} = 354.6667$
$\frac{1}{4}$ - $\frac{1}{2}$	-	-	-	-	-	B. Pineda Woods $\frac{131}{1} = 131$
$\frac{1}{2}$ - 1	[1	-	-	3.04 = 3	1	
1 - 2	[12 + 3A			3.04 = 3271	939	
2 - 3	[20 + 1B			3.04 = 459	68	
3 - 4	[16	-	-	3.04 = 49	4	
				Total ³⁷⁸²	1011	

1990 Census - 3.04 persons/household Noxubee County

PC = $\frac{1}{10}(1011) = 101.1$ 101

8d. Population

(lines 8a + 8b + 8c)

0 + 0 + 10.1

101

9. Resources

5

10. Wellhead Protection Area

Mississippi has no wellhead protection program

0

ENGINEERING CHART

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick

11. Targets

$$\begin{aligned} & \text{(lines } 7 + 8d + 9 + 10) \\ & 9 + 10 + 1 + 5 + 0 \end{aligned}$$

115Groundwater Migration Score for an Aquifer

12. Aquifer Score

$$\begin{aligned} & \text{[(lines } 3 \times 6 \times 11) \div 82,500] \\ & (50 \times 6 \times 115) \div 82,500 \end{aligned}$$

0.4182Groundwater Migration Pathway Score

13. Pathway Score

(value from line 12)

0.4182

ENGINEERING CHART

SUBJECT Delta Brick

FILE _____

APPN _____

DATE _____

BY _____

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEETDRINKING WATER THREATLikelihood of Release1. Observed Release

observed release to the surface water

02. Potential to Release by Overland Flow2a ContainmentTable 4-2

No evidence of hazardous substance migration from source area and:

neither 1) maintained engineered cover, or 2) functioning & maintained
runon control system and runoff management system.102b RunoffDrainage source areas and areas upgradientTable 4-3

Greater than 1,000 acres

4Table 4-4

Silty & loamy soil

CTable 4-5

4.3 inches

5Table 4-6252c Distance to Surface WaterTable 4-7 100 ft to 500 ft202d Potential to Release by Overland Flow[line 2a (2b + 2c)]10(25 + 20)450

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 6 OF 15

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick

3. Potential to Release by Flood

3a. Containment (Flood)

Table 4-8

10

3b. Flood Frequency

Table 4-9

25

3c. Potential to Release by Flood

(lines 3a X 3b)

10 X 25

250

4. Potential to Release

(lines 2d + 3c)

450 + 250 = 700 \Rightarrow 500 max.

500

5. Likelihood of Release

(higher of lines 1 and 4)

500

Waste Characteristics

6. Toxicity/Persistence

	Toxicity	Persist	Fac. Value
substance	H.S.R.	H.S.R.	Tab. 4-12
lead	10,000	1.0	10,000

Highest Value 10,000

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 7 OF 15

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick

7. Hazardous Waste Quantity

Table 2-5; Tier ;

see Part 5 on sheet No. 2 (Groundwater Pathway)

Table 2-6

same as above

10

8. Waste Characteristics

Top/Pers. X Hzz. Wz. Quan.

$$(1 \times 10^4) \times (1 \times 10^1) = 1 \times 10^5$$

Table 2-7

18

Targets

9. Nearest Intake

0

10. Population

10a. Level I Concentrations

0

10b. Level II Concentrations

0

10c. Potential Contamination

0

10d. Population

(lines 10a + 10b + 10c)

0

11. Resources

5

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 8 OF 15

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick

12. Targets

(Lines 9 + 10 + 11)

0 + 0 + 5

5

Drinking Water Threat Score

13. Drinking Water Threat Score

[(Lines 5 x 8 x 12) ÷ 82,500]

(500 x 18 x 5) ÷ 82,500

0.5454

HUMAN FOOD CHAIN THREAT

Likelihood of Release

14. Likelihood of Release

(Same value as line 5)

500

Waste Characteristics

15. Toxicity/Persistence/Bioaccumulation

	Toxicity	Persis.	Bioacc.	Tox/Pers.	Tox/Pers/Bio.
substance	H.S.R.	H.S.R.	H.S.R.	Tab 4-12	Tab 4-16
lead	10,000	1.0	5,000	10,000	5×10^7

Highest Value

5×10^7

16. Hazardous Waste Quantity

(Same value as line 7)

10

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 9 OF 15

FILE _____
APPN _____
DATE _____
BY _____

SUBJECT Delta Brick

17. Waste Characteristics

$$\text{Tox/Pers.} \times \text{Haz. Wt.} \times \text{Biomass} \\ (1 \times 10^4) \times (1 \times 10^1) \times (5 \times 10^3) = 5 \times 10^8$$

Table 2-7

100

Targets

18. Food Chain Individual

para. 4.1, 3.3.1 page 51, 620

$$1 \times 20 = 20$$

Table 4-13 Minimal stream

20

19. Population

19a. Level I Concentrations

0

19b. Level II Concentrations

0

19c. Potential Human Food Chain Contamination Fishery -

$$(6) \times (2) \times (5,280 \text{ ft}^2/\text{mi}) = \text{acres}$$

$$43,560 \text{ ft}^2/\text{acre}$$

$$\text{acres} \times \text{lbs./acre} = \text{lbs. Fish}$$

Table 4-18 (see back for calculations)

Table 4-13

$$PF = 1/10 () = 0.0096$$

19d. Population

(Lines 19a + 19b + 19c)

0.0096

20. Targets

(Lines 18 + 19d)

$$20 + 0.0069$$

20.0096

19c.

A. Slough

$$\begin{array}{c} L \\ (0.762 \text{ mi} \times \frac{5280 \text{ ft}}{\text{mi}}) \end{array} \times \begin{array}{c} W \\ 10' (\text{approx.}) \end{array} \div 43,560 \text{ ft}^2/\text{acre} = \text{acres}$$

$$0.9236 \text{ acres} \times 10 \text{ lb/acre} = 9.2363 \text{ lb-fish}$$

B. First Lake

$$(0.438 \text{ mi} \times \frac{5280 \text{ ft}}{\text{mi}}) \times 150' (\text{avg}) \div 43,560 \text{ ft}^2/\text{acre} = 7.9636 \text{ acres} \times 20 \text{ lb/acre} = 159.2727 \text{ lb-fish}$$

C. Second Lake

$$(0.36 \text{ mi} \times \frac{5280 \text{ ft}}{\text{mi}}) \times 150' (\text{avg}) \div 43,560 \text{ ft}^2/\text{acre} = 6.5454 \text{ acres} \times 20 \text{ lb/acre} = 130.9091 \text{ lb-fish}$$

D. Cut to Noxubee River

$$(200') \times 10' \div 43,560 \text{ ft}^2/\text{acre} = 0.0459 \text{ acres} \times 10 \text{ lb/acre} = 0.4591 \text{ lb-fish}$$

E. Noxubee River

$$(13.402 \text{ mi} \times \frac{5280 \text{ ft}}{\text{mi}}) \times 100' \div 43,560 \text{ ft}^2/\text{acre} = 162.4485 \text{ acres} \times 40 \text{ lb/acre} = 6,497.9394 \text{ lb-fish}$$

	Production	Pop. Value (Table 4-18)	x	Dilution (Table 4-13)	=
A	9.2363	0.03	x	1.0	= .03
B	159.2727	0.3	x	0.1	= .03
C	130.9091	0.3	x	0.1	= .03
D	0.4591	0.03	x	0.1	= .003
E	6,497.9394	3	x	0.001	= <u>.003</u>
					.096

$$PF = \frac{1}{10} (0.096) = 0.0096$$

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 10 OF 15

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick

Human Food Chain Threat Score

21. Human Food Chain Threat Score

$$[(\text{lines } 14 \times 17 \times 20) \div 82,500]$$

$$(500 \times 100 \times 20,0096) \div 82,500$$

12.1270

ENVIRONMENTAL THREAT

Likelihood of Release

22. Likelihood of Release

(same value as line 5)

500

Waste Characteristics

23. Ecosystem Toxicity/Persistence/Bioaccumulation

	Eco.Tox	Persist	Eco.Bio	E.T./Per	E.T.B.B.
Substance	H.S.R.	H.S.R.	H.S.R.	Tab 4-10	Tab 4-21
lead	1,000	1.0	5,000	1,000	5×10^6

Highest Value

5×10^6

24. Hazardous Waste Quantity

(same value as line 7)

10

25. Waste Characteristics

$$\begin{aligned} & \text{Eco.Tox/Per} \times \text{Haz.Waste Quant.} \times \text{Eco.Bio. Bt.} \\ & (1 \times 10^3) \times (1 \times 10^1) \times (5 \times 10^3) = 5 \times 10^7 \\ & \text{Table 2-7} \end{aligned}$$

56

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 11 OF 15

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick

Targets

26. Sensitive Environments

26a. Level I Concentrations

0

26b. Level II Concentrations

0

26c. Potential Contamination

Table 4-23 = 25 state land designated for wildlife or game management

Table 4-24 = 25 0.762 mi. wetlands

Table 4-13 = 1.301 (1.0 + 0.1 + 0.1 + 0.1 + 0.001)

SP = $\frac{1}{100} [25 + 25 \times 1.301]$

6.505

26d. Sensitive Environments

(lines 26a + 26b + 26c)

0 + 0 + 6.505

6.505

27. Targets

(Value from line 26d)

6.505

Environmental Threat Score

28. Environmental Threat Score

$[(\text{lines } 22 \times 25 \times 27) \div 82,500]$

$(500 \times 56 \times 6.505) \div 82,500$

2.2078

SURFACE WATER OVERLAND/FLOOD COMPONENT SCORE FOR A WATERSHED

29. Watershed Score

(lines 13 + 21 + 28)

0.5454 + 12.1270 + 2.2078

14.8802

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE

30. Component Score

(Value from line 29)

14.8802

SUBJECT Delta BrickSOIL EXPOSURE PATHWAY SCORESHEETRESIDENT POPULATION THREATLikelihood of Exposure1. Likelihood of Exposure550Waste Characteristics2. Toxicity

substance	Toxicity H.S.R.
lead	10,000

Highest Value10,0003. Hazardous Waste QuantityTable 5-2; Tier C; contaminated soil(see back for calculation) consider only first 2 feet of depth of contaminated soil.

$$45,420 \text{ ft}^3 \left(\frac{1 \text{ lb}}{2.7 \text{ ft}^3} \right) / 2,500 = 6.7289$$

Table 2-6para. 2.4.2.2Default Value104. Waste CharacteristicsToxicity x Haz. Wd. Quan.

$$(1 \times 10^4) \times (1 \times 10^1) = 1 \times 10^5$$

Table 2-718

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 13 OF 15

FILE _____

APPN _____

DATE _____

BY _____

SUBJECT Delta Brick

Targets

5. Resident Individual

0

6. Resident Population

6a. Level I Concentrations

0

6b. Level II Concentrations

0

6c. Resident Population
(lines 6a + 6b)

0

7. Workers

Number of workers - 100

Table 5-4

5

8. Resources

0

9. Terrestrial Sensitive Environments

0

10. Targets

(lines 5+6+7+8+9)

0+0+5+0+0

5

Resident Population Threat Score

11. Resident Population Threat

(lines 1 x 4 x 10)

(550 x 18 x 5)

49,500

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 14 OF 15

FILE _____
APPN _____
DATE _____
BY _____

SUBJECT Delta Brick

NEARBY POPULATION THREAT

Likelihood of Exposure

12. Attractiveness/Accessibility

Table 5-6

surrounded by fence or combination of fence & natural barrier

5

13. Area of Contamination

Table 5-7

(See back for calculation)

208,100 ft²

40

14. Likelihood of Exposure

Table 5-8

5

Waste Characteristics

15. Toxicity

(same value as line 2)

10,000

16. Hazardous Waste Quantity

(same value as line 3)

10

17. Waste Characteristics

(same value as line 4)

18

Targets

18. Nearby Individual

Table 5-9

Greater than 1/4 to 1 mile

0

13.

pile	$\frac{L \times W}{=}$	
A	$230 \times 130 =$	29,900
B	$230 \times 180 =$	41,400
C	$300 \times 200 =$	60,000
D	$250 \times 120 =$	30,000
E	$140 \times 70 =$	13,300
F	$270 \times 80 =$	21,600
G	$170 \times 70 =$	$\frac{11,900}{208,100 \text{ ft}^2}$

Department of Environmental Quality

ENGINEERING CHART

SHEET NO. 15 OF 15

FILE _____
APPN _____
DATE _____
BY _____

SUBJECT Delta Brick

19. Population Within One Mile

Distance Mile	# Houses Estimated	Population Estimated	Popul. Value Tab. 5-1a
0 - 1/4	—	—	
1/4 - 1/2	—	—	
1/2 - 1	10	30	0.1
		Total	0.1

Average persons/household, 1990 census - 3.04/household Noxubee County
 $PN = 10(0.1)$ 0.01

20. Targets

(lines 18 + 19)
 $0 + 0.01$

0.01

Nearby Population Threat Score

21. Nearby Population Threat

(lines 14 x 17 x 20)
 $5 \times 18 \times 0.01$

0.9

SOIL EXPOSURE PATHWAY SCORE

22. Soil Exposure Pathway Score

[(lines 11 + 21) ÷ 82,500]
 $(49,500 + 0.9)$

0.54

CHEMICAL INVENTORY
AUGUST 20, 1989

Chemicals found in the workplace as of August 20, 1989, DELTA
BRICK< Macon, MS.

PRODUCTION AND MAINTENANCE DEPARTMENT

Iron Oxide--- Color Pigment Industries : :
Manganese--Foote Mineral Company : :
Manganese Dioxide
Manganese Ore
Manganese sulfate
Chromite Mineral-Chromite --Foote Mineral
Barium Carbonate

Soda Ash.
Propane-----Conoco Inc.
Acetylene----Union Carbide
Oxygen-----Union Carbide)
Reflection Enamel Paint
Neutral Synthetic Detergent
Alkaline Detergent
Chrome Oxide Green-Paint Pigment--Kraft Chemical Company
Petroleum Hydrocarbons Plus Additives--Witco
Lubriguard GL-5 85w140 Specialty Oil Company
Georgia Silica Divisio---The Morie Company
Floor Dry, Super Fine, Dialoam, Celatom MP Grades)
Chevron Diesel Fuel No. 2
Chevron Pinion Grease MS-SP (Aerosol)
Chevron Automatic Transmission Fluid
Chevron EP Industrial Oil 220X
Chevron Soluble Oil
Chevron Delo 400 Motor Oil SAE 30
Chevron Insulating oil
Chevron AW Hydraulic Oil 32
Chevron Custom Motor Oil SAE 10W-402"y
Ochre-Natural Iron oxide pigmen
Fireclay shapes and Brick
Rutile
Liquid Hand Soaps
Oxyfuel Brazing rods
5197 ACORAL Spersastain
DK 203 41597A Coraal Spersastain
DK 192 41342A Pink Spersastain
Kalzen
Kaolin
Drakerfield Yellow
Hexemeter Phosphate
Brick Klenz
Natural Gas

BEFORE THE MISSISSIPPI COMMISSION
ON ENVIRONMENTAL QUALITY

MISSISSIPPI COMMISSION ON
ENVIRONMENTAL QUALITY

COMPLAINANT

VS.

ORDER NO. 2044 91

DELTA BRICK COMPANY
MACON, NOXUBEE COUNTY

RESPONDENT

AGREED ORDER

COME NOW THE Mississippi Commission on Environmental Quality
(Commission), Complainant, and Delta Brick Company, Respondent, in
the above captioned cause and agree as follows:

1.

On April 23, 1991, Respondent was contacted by Complainant and
notified of the following violation(s):

Delta Brick Company has been discharging wastewater without a
permit in violation of Mississippi Code, Section 49-17-29.

2.

In lieu of a formal enforcement hearing concerning the
violation(s) listed above, Complainant and Respondent agree to settle
this matter as follows:

- A. Respondent shall pay and Complainant accept the following
sum as a full and complete settlement thereof, said sum to
be payable as follows:

The sum of \$5,000 shall be paid to Complainant only in
the event Respondent fails to meet any of the
requirements set forth in Items B through D below.

- B. Construct temporary containment pond and divert all
contaminated discharges to waters of the State on or before
November 1, 1991.
- C. Respondent shall submit an engineering report to achieve
compliance with the issued NPDES permit on or before
December 1, 1991. This order will be amended at that time
to include schedule of implementation.

- D. Respondent shall achieve compliance with NPDES permit limitations within 60 days of completing treatment system construction.

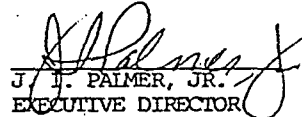
3.

Respondent understands and acknowledges that it is entitled to an evidentiary hearing before the Commission pursuant to Section 49-17-31 of the Mississippi Code Annotated (Supp. 1990), and that it has made an informed waiver of that right.

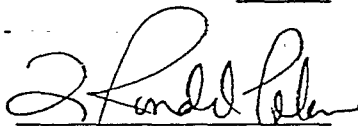
ORDERED, this the 7th day of June, 1991.

MISSISSIPPI COMMISSION ON
ENVIRONMENTAL QUALITY

BY:


J. T. PALMER, JR.
EXECUTIVE DIRECTOR
MISSISSIPPI DEPARTMENT
OF ENVIRONMENTAL QUALITY

AGREED, this the 4TH day of JUNE, 1991.


RESPONDENT



STATE OF MISSISSIPPI
DEPARTMENT OF ENVIRONMENTAL QUALITY
RAY MABUS
GOVERNOR

June 5, 1991

CERTIFIED MAIL NO. P 584 259 777


Mr. L. Ronald Polen
Vice President/General Manager
Delta Brick Company
Route 4, Box 2
Highway 14 West
Macon, Mississippi 39341

Dear Mr. Polen:

In order to settle certain environmental issues regarding Delta Brick Company, you have agreed to the conditions of Administrative Order No. 2044-91, which is enclosed.

If you have questions about this matter, please contact Mr. Louis Lavallee at telephone #601/961-5171.

Sincerely,


Charles H. Chisolm, Head
Office of Pollution Control

CHC:mh

Enclosure

1357 AIRLINE DRIVE
BOSSIER CITY, LA 71112

MID-SOUTH
ANALYTICAL LAB

FAX (318) 742-8118
(318) 747-6902

DATE RECEIVED 09/19/91

CUST. ID: 814

REPORT: 7481YY

COMPANY: DELTA BRICK PLANT

RT 4 BOX 2

MACON MS 39341

CLIENT:

SAMPLE: CLAY PILES E 0' TO 5'

CDC#: MSL091991DEF

LOCATION: DELTA BRICK

DATE COLLECTED: 09/10/91

TIME COLLECTED: 1203

TCLP METALS ANALYTICAL REPORT

TCLP METHOD 1311

ANALYSIS DATE: 09/23/91

TECHNICIAN: CGG

PARAMETERS	RESULTS	LIMIT	DETECTION LIMIT	METHOD
ARSENIC (ppm)	NC	5	0.010	7061
BARIUM (ppm)	1.989	100	0.400	7080
CADMIUM (ppm)	<0.020	1	0.020	7130
CHROMIUM (ppm)	<0.050	5	0.050	7190
LEAD (ppm)	36.89	5	0.050	7420
MERCURY (ppm)	NC	.2	0.010	7470/7471
SELENIUM (ppm)	NC	1	0.025	7741
SILVER (ppm)	NC	5	0.030	7760

PROTOCOL: Tests Methods for Evaluating Solid Wastes - SW-846 3rd
Edition. Method 1311.

< = Less than

> = Greater than

Bill McAnulty
LAB MANAGER

YY E (0-5') 1730.4 mg/kg Pb

Clearwater Consultants, Inc.
Environmental Engineers

109 North Jackson Street
Post Office Box 1328
Starkville, Mississippi 39759
(601) 323-8000
(601) 323-2200 Fax

September 26, 1991

Mr. David Lee, P.E.
Hazardous Waste Division
Office of Pollution Control
Post Office Box 10385
Jackson, Mississippi 39289-0385

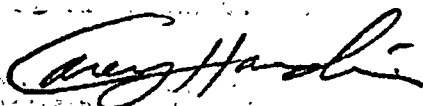
RE: Preliminary Laboratory Results
Site Investigation
Delta Brick - Macon, Mississippi

Dear David:

Please find enclosed the preliminary results for TCLP metals concentrations for the samples indicated.

After you have reviewed this information, please call me so that we may discuss the need for additional testing.

Sincerely,



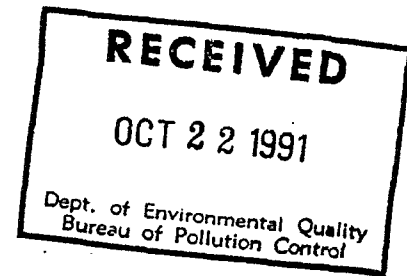
Carey Hardin, P.E.
CLEARWATER CONSULTANTS, INC.

Copy to Mr. Ron Polen, Vice President/General Manager, Delta Brick

Post-It™ brand fax transmittal memo 7671		# of pages > 4/1	
To	David Lee	From	C Hardin
Co.	OPC	Co.	Clearwater
Dept.	Haz Waste	Phone #	323-8000
Fax #	354 6612	Fax #	323-2200

**Clearwater Consultants, Inc.
Environmental Engineers**

109 North Jackson Street
Post Office Box 1328
Starkville, Mississippi 39759
(601) 323-8000
(601) 323-2200 Fax



October 17, 1991

Mr. David Lee, P.E.
Hazardous Waste Division
Office of Pollution Control
Post Office Box 10385
Jackson, Mississippi 39289-0385

RE: Preliminary Laboratory Results
Site Investigation
Delta Brick - Macon, Mississippi

Dear David:

As we last discussed, three additional samples were analyzed for TCLP-lead. I have prepared a summary of the TCLP-lead analyses, which is enclosed.

After you have had time to review this data, please call so that we may set a date for a meeting either in Jackson, or at the delta brick plant to discuss the significance of these data.

Sincerely,

A handwritten signature in cursive script, appearing to read "Carey Hardin".

Carey Hardin, P.E.
CLEARWATER CONSULTANTS, INC.

Enclosures

Copy to Mr. Ron Polen, Vice President/General Manager, Delta Brick



CLASSIFIED

STATE OF MISSISSIPPI
DEPARTMENT OF ENVIRONMENTAL QUALITY
RAY MABUS
GOVERNOR

January 24, 1992

Mr. Don Barrett
Barrett Law Offices
P. O. Drawer 631
Lexington, MS 39095

Re: Delta Brick - Macon

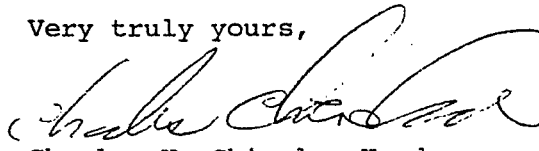
Dear Mr. Barrett:

This is a response to your letter expressing concern about possible contamination on Mr. Nicholson's property, adjacent to Delta Brick, in Macon. Samples analyzed by this agency in October, 1990, showed contamination sufficient to be of concern. One of these samples was taken from Mr. Nicholson's property. Since then, an order has been issued to Delta Brick to investigate the extent of the contamination and propose a method for remediation of the contaminated areas. Samples have been analyzed by Delta's consultant, and the site investigation report and proposal for remediation are due by the first week in February.

On January 9, 1992, David Lee and Larry Johnson of our agency met with Mr. Nicholson and Mark Boutwell of your office to discuss sampling on the Nicholson property. An agreement was reached among all parties as to sampling that would be conducted that would sufficiently characterize contamination on the Nicholson property. David Lee is communicating with Mark concerning a suitable date to conduct the sampling.

If you should need further information, please contact David Lee at (601) 961-5171.

Very truly yours,


Charles H. Chisolm, Head
Office of Pollution Control

DL:CHC:lfc

DL-8

Lab Bench No. 187

*Date of Test Initiation

188

*Date of Test Initiation

Columbus, Mississippi

Post Office Box 1204

March 26, 1992

To Whom It May Concern,

In November 1955, my family bought this property. We purchased it for the purpose of farming all kinds of vegetables, fruits, nuts and cotton. We were very successful in growing all of these until the Brick Plant was built.

The plant closed the road in which we used to get to and from our land. A railroad track was also built in the same area.

During this time, my father and other black farmers were afraid to complain or object to this act. At this time Blacks were being discriminated against and had no voice or equal rights.

WE then found another little road that we could use to get to our property which was located near a bridge. It wasn't much of a road but we had to use it.

Every year there was more water and this made it even more difficult to travel and we finally couldn't get in there at all.

My father and all the other farmers were still afraid to voice their discontent.

Many people would use the land to fish and to hunt for deers, squirrels, rabbits, birds and turkeys without our permission.

We would go there quite often to check on the land.

In October 1979, my father died and we went to examine it and we were informed that the Brick Plant was destroying our property by discharging a

lot of water on it. The Brick Plant had built this property just like a dam whereby everything would stay on our property.

At that time, we didn't know that lead or red lead and other chemicals were being discharged and continue to be discharged until this day.

Some of my family members had always planned to move back home to live and to farm this land and to grow different crops.

In August 1987, I went on the property and took some pictures. My family remained but I returned to New York to work a while longer.

My brother, Carl Nicholson moved here Jan. 1988. We both wanted to make sure that what we had heard was true concerning the plant's discharge of various lead and other chemicals.


I resigned from my job Oct. 12, 1989. I contacted the Dept. of Environment and in 1990 and they were asked to take samples of the property for testing of the soil. They tested for red lead and lead only. They reported that there was a large concentration of lead.

Mr. Harcourt took these samples and after his report, I talked to Bill Stewart from the Dept of Environment protection. He informed me that the land was of no value and could not be used for planting or hunting. He stated that no children should play there. He stated that there may be other chemicals but lead alone is very dangerous.

We felt that something was happening for a long time but we waited for things and laws to change to protect our civil rights and our property. We waited until what we felt was the right time to make a move to protect our property and our family's lives and environment.

When we were farming, there was water running from a Spring and we like other farmers, drank from this Spring daily. It was the only water available at the time. There was also a pump across from the Brick Plant on the other side of the street and we drank from that pump every evening as we left to go home. This pump water came from two holding pools near by.

Yours truly,

A handwritten signature in cursive script that reads "Curtis Nicholson". The signature is fluid and elegant, with a large initial "C" and a long, sweeping tail on the "n" of Nicholson.

Curtis Nicholson

Aug 15, 1993

The following names are from The
State of Michigan Dept. of Environmental
Quality;

Mr. Aaron Hartsock - 1990

Mr. Bill Stewart - 1990

Mr. Dave Lee - 1991

Mrs. Dorothy Lewis - 1991

Mr. Dave Singleton - 1991

Mr. Jim Neelands - 1991

Mr. Larry Johnson - 1992

Mr. Louis Janssen - 1991, 1992

Mr. Jim Palmer Jr. - 1991

Mr. J. Ronald Poler Vice President/
General Manager Boat B/ock - 1990

Cleanwater Consultants, Inc.
Environmental Engineers
Carey Warden, P.E.

Oct 29, 1993

Civil Action #
J92-0062 (L)(N)

In the United States District Court
for the Southern District of Mississippi
Jackson Division

Plaintiffs
Curtis Nicholson + Family
V. Boral Bricks, Inc.

We ask the Court for time, to
find an attorney. A discovery date
November 4, 1993.

Eugene Brooks IV & Edwin Flint Jr.
Schwartz ask motion to withdraw.

Thank you,

Sincerely
Curtis Nicholson

Noxubee County to be Test Case Under 1964 Civil Rights Act

The Noxubee County proposed toxic waste dump will be a test case under the 1964 Civil Rights Act. What must be determined is if race is a factor in Mississippi's continuing efforts to permit a hazardous waste project in Noxubee County. At issue is whether the toxic-waste dumps would expose the predominately black population of the county to high health and environmental risks.

About 70% of Noxubee citizens are black and unemployment is high. In the last three years, two of the largest waste management companies in the United States have tried to build giant hazardous waste facilities in Noxubee County.

A complaint and additional documents have been filed with the EPA's Office of Civil Rights charging disparate impact on the black community. The complaint charges that one particular group of citizens (in this case African-Americans) will bear more of a societal risk than everyone else. Plaintiff in the case is the AAEJ, African-Americans for Environmental Justice. Robert Wiygul of the Sierra Club Legal Defense Fund in New Orleans is lead attorney on the case.

Adapted from Gulf Coast Tenant's Voice, Newsletter of the Gulf Tenants' Organization, Vol. 6, Number 1, March 1994, Pat Bryant, Executive Director.

Newsletter Funded by Ben & Jerry's

Ben & Jerry's Foundation, based in Vermont, responded to our urgent request for help in funding our newsletter. They have provided us with enough money to publish four quarterly newsletters during 1994-95.

As soon as we were notified that we had been awarded the grant, letters went out to contacts all over the state asking for articles and mailing lists. This newsletter is the first effort of EJP to bring information of interest to all of the groups that are struggling to keep our state from being a toxic waste dumping ground. Environmental racism is obviously alive and well here in Mississippi!

Copies of the EJP newsletters are

free - just make sure we have your name and address. If you would like to be on the mailing list, please forward your name and address to: Environmental Justice Project, 921 N. Congress Street, Jackson, MS 39202. We welcome calls at 601-355-7495.

Articles are always welcome. If you don't want to write the article, call us with information and we'll get the word out. Our next issue should be published and mailed by July 15.

Credit for the idea of a newsletter goes to Connie Tucker of Southern Organizing Committee (SOC) and Charlotte Keys, SOC State Co-ordinator, member of the Environmental Justice Project Advisory Board and President of Jesus People Against Pollution (JPAP), Columbia, MS.

ENVIRONMENTAL JUSTICE PROJECT
MISSISSIPPI HUMAN SERVICES AGENDA

921 N. Congress
Jackson, MS 39202
(601) 355-7495

June 28, 1994

Mr. Curtis Nicholson
494 Dogwood Boulevard
Columbus, MS 39701

601-

Dear Mr. Nicholson,

I regret telling you that no attorney accessible to us has agreed to accept your case on a contingency basis. The reasons given are that this case is actually two cases, both of which require extensive investigation.

The first is the issue of the legal processes themselves. The second is the issue of the environmental consequences of the alleged brick plant spills onto your land. The legal time that it would take to untangle everything is seen as all-consuming.

We do not have the resources to help you and I am truly sorry.

Sincerely,



Deirdre S. McGowan, Ph.D.
Project Director

DELTA BRICK
MACON, MISSISSIPPI

TCLP RESULTS

Original Sample Designation		Analytical Results	
Laboratory	On-Site Location	Lead Concentration mg/kg	TCLP-Lead mg/l
YY	E (0-5')	1,730.4	36.9
N	S14	1,108.5	17.6
ZZ	A (15-20')	1,065.0	26.5
BB	E (5-10')	773.5	5.6
H	S8	644.5	4.6
Y	A (0-5')	494.5	7.3
V	S22	477.6	3.1

NOT CITED IN 1/17/95
LETTER FROM DEQ

I SUSPECT THESE ARE
CLAY PILES SAMPLES

JUL 5-95 WED 14:37 DEPT. OF ENVIRONMENTAL PROTECTION

January 17, 1995

Curtis Nicholson
P. O. Box 1204
Columbus, MS 39703

Dear Mr. Nicholson:

This letter is being sent to respond to your recent inquiry expressing concern about the status of activities at the Boral Brick facility in Macon. A letter was sent to you on February 4, 1993 explaining the status of on-site investigations at that time. However, that letter did not review the site activities prior to that time. This letter will attempt to clarify those activities.

The first response by this agency was on October 10, 1990, by Aaron Harthcock of our north regional office. He talked to you and walked the area of concern at the brick plant and on your property. Discharges from the plant were noted and samples were taken from the north and west discharge ditches, adjacent to the clay piles, on Boral Brick's property. The total lead content in the west ditch ranged from 160 mg/kg to 704 mg/kg. Lead in the north ditch was found to be 468 mg/kg. Once results of samples were obtained, our office was notified for potential action to be taken.

Discussions with officials of the firm led to the issuance of an order on May 13, 1991, requiring the implementation of a workplan to identify the areas of contamination on Boral Brick property and on your property.

On April 11, 1991, David Lee of our Hazardous Waste Division met with officials of Boral Brick and their consultant to discuss preparation of the site investigation plan. It was agreed that the clay piles needed to be sampled, and that excavation of a trench into each pile with a trackhoe might be the best approach. On this day, David Lee also met with you and discussed your concerns with possible contamination on your property.

On June 27, 1991, the site workplan was received in our offices. On August 5, 1991, a letter was sent to the consultant approving the workplan. Communication with the Barrett Law firm of Lexington, Mississippi during the months of August through November, 1991 were made concerning the possibility of further investigating the contamination. In April, 1992, a representative of the Barrett firm, along with representatives of Boral Brick, and David Lee and Larry Johnson of DEQ, walked the property boundaries to the north of the brick plant. These representatives had a copy of the county tax assessor's property map for the area, which showed current property boundaries. The Boral property, according to the map, extended

660 feet farther to the north than was previously thought. This meant that sediment runoff from the clay piles on the brick plant property was confined to Boral's property. Previous samples showed elevated lead extending about 100-200 feet from the piles. During this survey, the southern boundary of your property was identified, and a soil sample was taken at this point. This sample showed lead levels to be 23 mg/kg in the 1-6" zone, 10 mg/kg in the 7-12" zone, and 129 mg/kg in the 13-18" zone. At the time, soil cleanup levels for lead were 250 mg/kg. Cleanup levels have since been revised to 500 mg/kg for lead. As a result of these findings, the Barrett firm agreed that no further determinations of lead contamination would be necessary.

The investigation of the clay piles is continuing. Samples were taken from the piles in summer, 1993. Engineers at Mississippi State University are analyzing the samples to determine leaching characteristics, and will use this information to propose methods for eliminating the piles.

During the course of all these investigations, no information was seen that indicated any levels of contamination of concern on your property. For this reason, this agency does not intend to pursue any type of remediation on your property.

Sincerely

Jane Buttross
Legal Section, Office of Pollution Control

Author: Gerald Foree at REGION4
Date: 06/21/95 05:28 PM
Priority: Normal
TO: Brian Farrier
CC: Vivian Jones
CC: Gerald Foree
Subject:

----- Message Contents -----

FYI:

I spoke with Curtis Nicholson in Noxubee County, Mississippi. He is sending me the PA petition and some photos a potential site. We should receive them either Friday or early next week.

Curtis Nicholson (Noxubee County, Ms)
601/3294166

Author: Brian Farrier
Date: 06/30/95 04:02 PM
Priority: Normal
Receipt Requested
TO: Corlis McCormick
CC: Joanne Benante
CC: Gerald Foree
CC: Arthur Collins
Subject: Weekly Report- July 5, 1995

----- Message Contents -----

Staff met with PRPs for Stauffer (Lemoyne Plant) NPL site to discuss comments for RI finalization. Revised RI due to EPA July 7, 1995, with finalization anticipated at end of August. ORD is continuing its review the toxicity data for thiocyanate. PRP meeting will be held in August to review that data, and begin peer review process for FS. (Farrier, x6255; Benante, x6234).

Staff has received information in response to PA Petition on a site in Mississippi. This site will be referred to ERRB, and a site visit planned to investigate alleged environmental injustice due to unpermitted discharges. (Farrier, x6255, Foree, x6150).

1] From: Brian Farrier 7/6/95 8:45AM (968 bytes: 18 ln)
o: Gerald Foree, Gail Scogin
c: Arthur Collins
subject: Delta Macon Brick- MS

----- Message Contents -----

I asked the state on July 5 to send me a status on the above site, which was the subject of the recent PA Petition we received.

Phillip Weathersby sent me a letter that DEQ sent Mr. Nicholson (dated January 1995) that documented a partial history of this site. Apparently, there is some question as to whether the lead contamination has actually migrated offsite onto Mr. Nicholson's property.

If the contamination is contained onsite, and the state is successful in addressing the lead contaminated, onsite clay piles, then I would recommend that we not place this site on CERCLIS.

The letter is on my desk.

Brian

G.M.F.

I have a
copy of all this.

If you can go,
ask for actual
subsistence (lodging)
for Meridian.
None of the decent
hotels will.

you the
(4000). I'll
the Hampton.

is all
up to
if screening

and/or

8/2.

Bl A

601/840 1424

494 Dogwood

Columbus, Ms

45 N

9615302

Brian, It appears that the letter I faxed you was not mailed, although I am not positive. I sent it only as a general overview. TCLP samples have been taken in the past (1991, 1992) which exceeded regulatory limits. Samples referred to in the letter from Jane Buttriss are being analyzed by Miss. State University (Dr. Hill) using a multiple batch extraction process developed at the university. Supposedly it will determine how much lead could be leached out of soil under natural conditions. David Lee in our RCRA section said that he expects the report in the near future(???). I suppose we are waiting for the report to determine what type of remediation is necessary. Let me know if you have any other questions. Phillip

David Lee
601/9615377

Terry Banks
Branch Chief

P.S. Sorry it took so long to respond. I was out of the office. Thursday and Friday attend a Restoration Advisory Board meeting.

FAX

To: <u>Brian Farrier</u>	From: <u>Phillip Wexthorby</u>
	Office of Pollution
	Control
	P.O. Box 10385
	Jackson, MS
	39289-0385
Phone: _____	Phone: 601/961- <u>5302</u>
Fax: <u>404-347-4862</u>	Fax: 601/961-5741

Date: 7/11/95, 1995 ☒ Routine ☐ Priority

Number of pages, including this one: 2

Message: Delta Brick S.H. (Macon)

Brian, It appears that the letter I faxed you was not mailed, although I am not positive. I sent it only as a general overview. TCLP samples have been taken in the past (1991, 1992) which exceeded regulatory limts. Samples referred to in the letter from Jane Butters are being analyzed by Miss. State University (Dr. Hill) using a multiple batch extraction process developed at the university. Supposedly it will determine how much lead could be leached out of soil under natural conditions. David Lee in our RCRA section said that he expects the report in the near future(??). I suppose we are waiting for the report to determine what type of remediation is necessary. Let me know if you have any other questions. Philip

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January 17, 1995

Curtis Nicholson
P. O. Box 1204
Columbus, MS 39703

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Sincerely

Jane Buttross
Legal Section, Office of Pollution Control

404-347-4862

Brian

The Delta Brick Site in Macon has been a problem for approximately 5 years. A man named Curtis Nicholson has been complaining about Lead contamination on his property. Attached is a letter from our legal staff outlining past events regarding this site. David Lee of our RCRA Generator section has been overseeing the site due to lead contaminated soil pits. If you need anything further, give me a call
Phillip

Curtis Nicholson 601-329-4166 / ^{or} 601-840-1424

US 45 south @ St Hwy 14 10am Aug 2
Macon, MS

brown Caddy or Datsun 210 (blue)

1. COST CENTER: 04		TAT - CONTRACT 68-WO-0036		2A. NO: 04-9507-0008	
		TECHNICAL DIRECTION DOCUMENT (TDD)			
		OHM EMERGENCY RESPONSE AND			
		SPILL PREVENTION PROGRAM		2B. TYPE: 01	
		Roy F. Weston		SITE INVESTIGATIONS CERC	
		DRAFT		LA 104(b)	
3A. PRIORITY:		4. SOURCE OF FUNDS:		5A. EPA SITE NAME:	
[] HIGH (1)		[X] CERCLA (1)		DELTA BRICK - MACON, MS	
[X] MEDIUM (2)		[] 311/AOPA (2)		6. COMPLETION DATE: 08/31/95	
[] LOW (3)		[] UST (3)			
		[] FEMA (4)		7. OVERTIME APPROVED: [] YES [X] NO	
		[] CEPP (5)		[] ATTACHED	
3B. EPA CONTACT:		[] N/A (6)		[X] YES [] NO	
ROSEN, BOB		5C. SSID #:		[] PICK UP	
		[] TAT/FIT (7)			
		5D. CERCLIS ID:			
		[] ENFORCE (8)			
9A. GENERAL TASK DESCRIPTION: Meet OSC at Hampton Inn, I-20 Meridian MS, 0800 CST 8/2/95. Travel to Macon, MS with OSC, conduct XRF/Spectrace sampling as directed, low levels of lead contaminated soil suspected, some sampling may be requested (to carry to lab-mounted Spectrace at Pelham, GA site), no reports anticipated, OSC will dispose of PPE, no photodocumentation, possible request for rough map of XRF sampling locations.					
9B. ESTIMATED COST: \$ 3406.00		ESTIMATED HOURS:		54	
10. SPECIFIC ELEMENTS:		11. INTERIM DEADLINES:			
Conduct Sampling Surveys for Soil		08/02/95			
Prepare Safety Plan		08/02/95			
Prepare Site Sketch/Map		08/31/95			
Respond to Site		08/02/95			
12. DESIRED REPORT FORM: FORMAL REPORT [] LETTER REPORT [] FORMAL BRIEF []					
OTHER (SPECIFY): no reports, only draft map of sample pts					
13. COMMENTS: No reports, only draft map of XRF sampling locations					
14. AUTHORIZING DPO: CAMP, SHARON					
VERBAL DATE: 07/25/95				15. DATE:	
(SIGNATURE)				/ /	
16. RECEIVED BY:		[] ACCEPTED WITH EXCEPTIONS		[] REJECTED	
[] ACCEPTED				/ /	
(TATL SIGNATURE)					
18. DESCRIPTOR:					



SUITE 325, BUILDING 300
1575 NORTHSIDE DRIVE, NW
ATLANTA, GA 30318-4208
PHONE: 404-352-4147
FAX: 404-352-0659

FACSIMILE TRANSMITTAL

FAX: 404-352-0659TO: Bob Rosen OSC

Recipient's Telecopy

Telephone # _____

Recipient's Confirmation

Telephone # _____

FROM: Ronald Starks

Originator's Telephone # _____

TOTAL PAGES: 3 (incl. cover sheet)

ORIGINAL WILL:

- ☐ Follow via mail
☐ Follow via messenger
☐ Follow via overnight service
☐ Not be sent

R Starks
(Sent By)

(Sender's Telephone #) _____

(Date) _____

(Time) _____

COMMENTS:

The documents accompanying this telecopy transmission contain confidential, privileged or proprietary information that either constitutes the property of Roy F. Weston, Inc. (WESTON®) or, if the property of another, represents information that is within WESTON's care, custody and control. The information is intended to be for the use of the individual or entity named on the transmission sheet. If you are not the intended recipient, be aware that any disclosure, copying or use of the contents of this telecopied information is prohibited. If you have received this telecopy in error, please notify us by telephone immediately so that we can arrange for the retrieval of the original documents at no cost to you. Thank you for your assistance.



Building 300, Suite 325
1575 Northside Drive, N.W., Atlanta, Georgia 30318-4208
404-352-4147 • Fax 404-352-0659

TECHNICAL ASSISTANCE TEAM FOR EMERGENCY RESPONSE REMOVAL AND PREVENTION
EPA CONTRACT 68-WO-0036

MEMORANDUM

TO: Bob Rosen, OSC
U.S. EPA, Region IV

FROM: Ronald Starks, RSO
TAT, Region IV

RE: DELTA BRICK

Here are the results from the analysis of the soil samples taken on 02 August 1995. If you need any other metals analyzed please let me know.

Gerald 758-1110
Nicholson 601-840-1424

- Conference call
- Call 1st party, ask them to hold
 - Press **TRF**
 - Dial desired #
 - after call established press **CNF**
 - Both (3) parties online

Roy F. Weston, Inc.

MAJOR PROGRAMS DIVISION

In Association with Foster Wheeler USA Corporation, Resource Applications, Inc., C.C. Johnson & Malhotra, P.C.,
R.E. Sarriera Associates, and GRB Environmental Services, Inc.

REAC Work Assignment #
Spectrace 9000 XRF Soil Screening

Site Name:

Units: ppm

Sample Code	Date Run	Pb Raw	Cd Raw	As Raw	Cu/Pb Raw
#DB-W1	5-AUG-1995	261.72	12.44	-0.02	2133.93
#DB-W2	5-AUG-1995	58.64	-77.64	-20.91	312.91
#DB-W3	5-AUG-1995	54.32	-69.56	-10.25	1990.27
#DB-W4	5-AUG-1995	5.19	-160.38	35.80	-740.91
#DB-W5	5-AUG-1995	34.09	-87.64	-6.47	-633.93
#DB-W6	5-AUG-1995	11.92	13.80	54.37	-495.37
#DB-W7	5-AUG-1995	0.00	-23.11	31.36	-529.51
#DB-W8	5-AUG-1995	16.23	-101.42	-19.25	-794.68

Application: SOILS with U,Th,As 0070 12-13-1990

NOTE: Draft results, no QA/QC evaluations performed. All data are subject to change.

RECORD OF COMMUNICATION	<input checked="" type="checkbox"/> PHONE CALL <input type="checkbox"/> DISCUSSION <input type="checkbox"/> FIELD TRIP <input type="checkbox"/> CONFERENCE <input type="checkbox"/> OTHER (SPECIFY)	
TO: Mr. Curtis Nicholson	FROM: Noxubee Co. Mississippi	DATE: 8/28/95 TIME: 1615
SUBJECT: Delta Macon Brick		
SUMMARY OF COMMUNICATION <ul style="list-style-type: none"> * discussed briefly ERRB (B. Rosen) sampling event (approx. 8 samples were collected) * discussed possible future sampling * Mr. Nicholson informed me that Mr. Grover Hankins, attorney, will be contacting me. 		
CONCLUSIONS, ACTION TAKEN OR REQUIRED <ul style="list-style-type: none"> * conference call scheduled for 9/1/95 w/ B. Rosen, OSC, G. Foree, B. Farrier, and any other interesting parties. 		
INFORMATION COPIES TO: <div style="text-align: center; font-size: 2em; margin-top: 20px;">646</div>		

Author: GeraldF Foree at REGION4

Date: 8/29/95 8:06 AM

Priority: Normal

TO: Bob Rosen

TO: Brian Farrier

TO: Arthur Collins

TO: Mario Villamarzo

CC: Vivian Jones

BCC: GeraldF Foree

Subject: Delta Macon Brick - Mississippi

----- Message Contents -----

There will be a conference call with Curtis Nicholson concerning the above-mentioned facility on Friday, September 1, 1995 at 10:00.

The meeting will be in the Emergency Response Center, 1st floor Courtland. This should be a brief call with Mr. Nicholson. Bob Rosen, OSC, is going to discuss the analytical results of his sampling event and answer any questions Mr. Nicholson may have.

If you have any questions, call me at 6150.

Thank you.

Gerald F. Foree

Author: Arthur Collins at REGION4
Date: 8/29/95 9:25 AM
Priority: Normal
TO: GeraldF Foree
Subject: Re: Delta Macon Brick - Mississippi

----- Message Contents -----

Gerald I forgot that friday is my compressed off day! Keep me posted on the developments of this site. Thanks

Arthur

Reply Separator

Subject: Delta Macon Brick -

Mississippi

Author: GeraldF Foree at REGION4
Date: 08/29/95 08:06 AM

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Thank you.

Gerald F. Foree

Author: GeraldF Foree at REGION4

Date: 8/29/95 8:06 AM

Priority: Normal

TO: Bob Rosen

TO: Brian Farrier

TO: Arthur Collins

TO: Mario Villamarzo

CC: Vivian Jones

BCC: GeraldF Foree

Subject: Delta Macon Brick - Mississippi

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If you have any questions, call me at 6150.

Thank you.

Gerald F. Foree

Author: Brian Farrier at REGION4

Date: 9/6/95 7:54 AM

Priority: Normal

TO: Vivian Jones

TO: GeraldF Foree

TO: Bob Rosen

Subject: Re: boral/delta brick & Nicholson

----- Message Contents -----

Just a follow up. I spoke to Vivian about this situation after our "conference call" Friday (the conference call that "wasn't"). As a result of my conversation with Vivian, I feel that I should write a very brief summary for Mr. Nicholson, mail it to him with copies to all of you. The letter will inform him of the lab results and an explanation of why they differed from the field results. I also want to express my concerns to him about not actually sampling his property (which was his fault). I will propose that he have a surveyor flag his property boundaries in preparation for another visit by EPA. At that time, I will sample soils on his property and have the samples analyzed for a wider range of contaminants (Volatiles, Semi-Volatiles, RCRA Metals, PCBs/Pesticides).

My schedule will not allow me to make this trip before October 1. Given the current budgetary uncertainties, I don't believe I will actually schedule anything until the smoke clears in mid-October (Bob the optimist).

Please let me know if any of you have concerns, questions or issues with what I am proposing. In some respects, I think I have enough information to hand this back to Gerald and Brian. On the other hand, there are loose ends (not having actually sampled his property) that make me a little uncomfortable.

Please comment and I will either drop it or proceed to draft a letter based on your comments.

Thanks,

Bob x6128

Bob, if you and Vivian feel that another sampling round would be advisable, that's OK with me. The samples you collect will be used when calculating the HRS score when the Preliminary Assessment (PA) is performed. As I said, the main purpose of the PA is to collect data pertinent to the HRS, such as groundwater usage within 4 miles, definition of the 15 mile surface water pathway, etc. The sampling you propose would be helpful when considering whether contaminants have migrated off the Delta property.

However, it is very unlikely that this site will score, due to lead (low surface water score), and to lack of targets in the area. I doubt that any sampling you do will enhance the score that much.

We need to get this site on CERCLIS soon since Mr. Nicholson did respond to a PA petition. The state will be tasked to do the PA in 1996.

Brian

Author: Bob Rosen
Date: 9/11/95 4:51 PM
Priority: Normal
TO: Vivian Jones
TO: GeraldF Foree
TO: Brian Farrier
Subject: Re[2]: boral/delta brick & Nicholson

----- Message Contents -----

Bob, I believe that Mr. Nicholson needs an explanation of the reason for the differences in test results on the lead. Did you request in writing the need for land boundaries?

I will discuss the need for boundary clarification with Mr. Nicholson in my letter to him. I will cc: all of you with the letter once it is prepared.
bob

thanks for your interest and response

Author: Vivian Jones
Date: 9/11/95 4:41 PM
Priority: Normal
TO: Bob Rosen
TO: GeraldF Foree
TO: Brian Farrier
Subject: Re: boral/delta brick & Nicholson

----- Message Contents -----

Bob, I believe that Mr. Nicholson needs an explanation of the reason for the differences in test results on the lead. Did you request in writing the need for land boundaries?

Author: Brian Farrier at REGION4
Date: 9/13/95 10:44 AM
Priority: Normal
TO: Vivian Jones
TO: GeraldF Foree
TO: Bob Rosen
CC: Arthur Collins
Subject: Re: delta brick letter

----- Message Contents -----

Bob, I've attached a file with a short paragraph to add at the end of your letter, regarding the PA and the one year deadline. I put the site in Wastelan (CERCLIS) today.

You sound as if you are politically committed to another sampling round! That's fine with me, and we'll consider the additional data with the PA.

I also have some minor revisions I will hand carry- let me sign off on the letter before mailing out.

Brian

Reply Separator

Subject: delta brick letter

Author: Bob Rosen
Date: 09/12/95 04:07 PM

attached is a file named "curtis.002". this is a copy of the letter to curtis nicholson regarding our investigation into alleged contamination on his property in macon, ms.

thanks,

bob

The Delta/ Boral Brick site has been added to the CERCLIS database, in response to the Preliminary Assessment (PA) Petition that you recently submitted to EPA. Accordingly, it will be evaluated pursuant to the policies set forth by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Re-Authorization Act of 1986 (SARA). The PA will be performed within one year of September 13, 1995. The primary purpose of the PA is to determine if this site meets the criteria for remedial action under the National Priorities List (NPL).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

September 12, 1995

4WD-ERRB

Mr. Curtis Nicholson
P.O. Box 1204
Columbus, Mississippi 39703

Dear Mr. Nicholson:

I am sorry to take so long to get this information to you. Gerald Foree, Brian Farrier and I attempted to set up a conference call with you on Friday, September 1 to discuss our findings, but were unable to reach you.

During our August 2, 1995 field investigation we collected eight soil samples for analysis. The analytical results are summarized below. All units are in parts per million of lead in soil.

Sample 1 - 261 ppm	Sample 2 - 59 ppm	Sample 3 - 54 ppm
Sample 4 - 5 ppm	Sample 5 - 83 ppm	Sample 6 - 12 ppm
Sample 7 - non-detect	Sample 8 - 16 ppm	

The highest lead level found was 261 ppm. This is approximately one-half of our normal cleanup standard and by itself, would not be considered a significant health threat nor a high enough level of lead contamination to prompt further EPA action.

I realize these results are significantly lower than the results we obtained on the day of our field investigation. As someone who deals with these numbers on a daily basis, I do not believe it inconsistent that our field screening instrument read from 2,000 to 9,000 ppm lead, while the laboratory results were significantly lower. Because of calibration and accuracy problems with hand held screening instruments, we do not rely on the results until they can be confirmed by laboratory analysis. In this instance, you were in the field with us and were able to see the instrument readings as samples were screened. This probably created some uncertainty for you, but the analytical results above are conclusive, whereas the field instrument was merely an initial screening tool.

There is a more pressing issue to discuss than the inconsistencies between EPA's field screening and laboratory results. When I examined aerial photos and survey maps of Delta/Boral Brick property, I realized that the investigation

team never actually entered your property. All of us remember asking you repeatedly if we were on your property and you assured us that we were. The State's files document at least one previous occasion where this same problem occurred.

This is a problem for two reasons. First, you have intentionally or unintentionally misled investigators on at least two occasions. Aside from the unnecessary cost to taxpayers, all we accomplished was to unknowingly confirm that Delta/Boral does not appear to have a soil lead contamination problem. Unfortunately, my goal was to investigate contamination on your property, not Delta/Boral Brick's property.

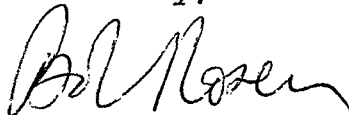
The second problem is more complicated. For the sake of this investigation and based on your allegations of contamination on your property, I made the assumption that Delta/Boral was the source of potential contamination. Since I sampled their property and did not find contamination, it is unlikely that I will now find contamination from Delta/Boral on your property. However, without more conclusive evidence, I cannot safely make this assumption.

In order to investigate your allegations, it will be necessary to return to Macon for a more thorough investigation. As a pre-condition, I will have to ask you to have surveyors accompany us or flag your property lines prior to our site visit in order that we be assured that we are obtaining samples from your property. I will also expand the sampling to include Volatile Organics, Semi-Volatile Organics, RCRA Metals, Pesticides and Poly-Chlorinated Biphenyls (PCBs).

If you are agreeable to my surveying pre-condition, I would like to return to Macon sometime in mid or late October. In the meantime, please review the information I have discussed in this letter and let me know if you are willing to have your property lines surveyed prior to our visit.

Thank you for your time and patience. Please feel free to contact me if you have any questions or concerns. My office number is 1-800-962-6216, extension 6128.

Sincerely,



Robert N. Rosen
Emergency Response and Removal Branch

cc: V. Jones
G. Foree
B. Farrier

October 12, 1995

4WD-ERRB

MEMO

SUBJECT: Summary of Activity to Date
Delta Brick RAT/Site Assessment

FROM: R. Rosen, OSC *Max 10/12/95*
Emergency Response and Removal Branch

TO: File

Initial site visit was conducted on August 2, 1995 when OSC Rosen, MSDEQ Ken Whitten and EPA TATs Ron Stark and (can't remember name of second TAT) met with the property owner, Curtis Nicholson, in Macon, MS. We followed him to the site where Boral Brick now operates (formerly Delta Brick). Unbeknownst to the OSC, Nicholson had called several members of the media and they met us at the site. The OSC was careful to avoid aligning himself up with Nicholson since it was obvious Nicholson was trying to have himself seen as on the side of EPA.

After the media interviews, we prepared instruments and sample collection materials then followed Nicholson to his property. We walked north beyond the Boral brick storage yard, then worked our way north and west into the woods north of the yard. We then took 15 to 20 readings on a hand held XRF unit called an "X-Met". Readings generally showed 2,000 to 9,000 ppm lead in soil. We collected eight soil samples from representative areas (i.e., hot samples) and later had them analyzed by TAT at their Pelham site in Georgia, using a bench mounted Spectrace XRF unit.

During sample collection and XRF shoots, the OSC repeatedly asked Nicholson if he was sure we were on his property. During past MSDEQ investigations, samples were obtained and investigations conducted, allegedly on Nicholson's property, but in fact not on his property. Whether Nicholson simply didn't know his property lines or ignored them is unknown, but was documented by DEQ. Nicholson kept saying, "yes", meaning we were clearly on his property.

After returning to our vehicles and leaving Nicholson, Rosen and Whitten went to Boral Brick and met with the facility manager, Mr. Barry Storer. We discussed what we were doing behind his facility and also mentioned the lead levels detected on the X-Met. He claimed to have called Nicholson a number of times to offer to buy Nicholson's landlocked property behind Boral, but Nicholson refused to talk to him. Storer then showed us aerial photos and survey maps of their property and it was

very obvious that we never got close to Nicholson's property.

Subsequently, the samples were analyzed and found to have very low levels of lead, from non-detect to 83 ppm with one sample as high as 261 ppm. A letter explaining the results was prepared and sent to Nicholson after he failed to make himself available for a conference call set up by Gerald Foree. Nicholson later called Foree and complained about an EPA cover-up but Rosen did not participate in that call.

Rosen plans to return to Macon and sample on Nicholson's actual property in order to complete this investigation. Since Boral Brick was the alleged source of lead contamination, it seems highly unlikely that we will find contamination further north of Boral than where we already sampled. However, Rosen plans to broaden the sampling parameters to include VOA, Semi-VOA, PCB/Pesticides and RCRA Metals. A precondition set forth in the letter to Nicholson requires him to have property lines surveyed and flagged prior to EPA's arrival.

No action has occurred recently due to budget constraints but the trip will take place as soon as travel monies are made available.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

4WD-ERRB

Mr. Jerry Banks, Chief
Hazardous Waste Division
Mississippi Department of
Environmental Quality
P.O. Box 10385
Jackson, Mississippi 39289-0385

JAN 11 1996

SUBJ: Delta Brick Site, Macon, Mississippi

Dear Mr. Banks:

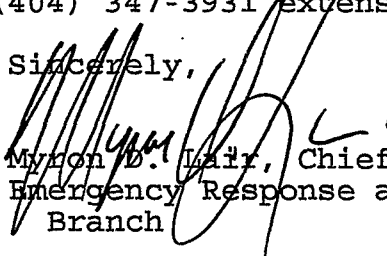
On October 12, 1995, On-Scene Coordinator (OSC) Robert Rosen of the U.S. Environmental Protection Agency's Emergency Response and Removal Branch (ERRB) conducted a removal assessment for potential removal action eligibility under the National Contingency Plan (NCP). Results from the assessment were evaluated using criteria from Section 300.415 of the NCP and current ERRB program guidance.

The Site is a brick production facility that is alleged to have caused lead contamination of adjacent properties. ERRB conducted soil sampling of the Site to determine the extent of any lead contamination. Analytical results from ERRB's sampling event showed levels of lead in soil well below removal action criteria.

Based upon ERRB's review, the above referenced site does not meet the criteria for removal eligibility. This determination does not preclude any other investigation activities or response actions by other parties which may still be appropriate for this site. This Site is presently undergoing review by the EPA's Site Assessment Section and preparation of a preliminary assessment is ongoing. Should site conditions change or additional information become available, ERRB will re-evaluate this site as necessary.

Should you have any questions concerning ERRB's determination, please contact Robert Rosen, On-Scene Coordinator, at (404) 347-3931 extension 6128 or Mr. Shane Hitchcock, Chief of Removal Operations Section, at (404) 347-3931 extension 6122.

Sincerely,


Myron D. Lair, Chief
Emergency Response and Removal
Branch



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

4WD-ERRB

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Sincerely,

Myron D. Lair, Chief
Emergency Response and Removal
Branch

STILMAN

SL 1/10/96

HITCHCOCK

ASH

The following is an update to On-Scene Coordinator R. Rosen's memorandum to the file dated October 12, 1995 regarding the Delta Brick Site:

Analytical results from an August 2, 1995 sampling event showed low levels of lead contamination at the subject Site. These levels were well below removal action criteria. During the August 2, 1995 sampling event no source area was discovered. In December of 1995 Gerald Foray of EPA Site Assessment indicated that a preliminary assessment for possible NPL inclusion would be conducted.

Based on the lack of any significant contamination or source no further action by ERRB is recommended at this time.

Terry Stilman, OSC
1/11/96

October 12, 1995

4WD-ERRB

MEMO

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Delta Brick RAT/Site Assessment

FROM: R. Rosen, OSC
Emergency Response and Removal Branch

TO: File

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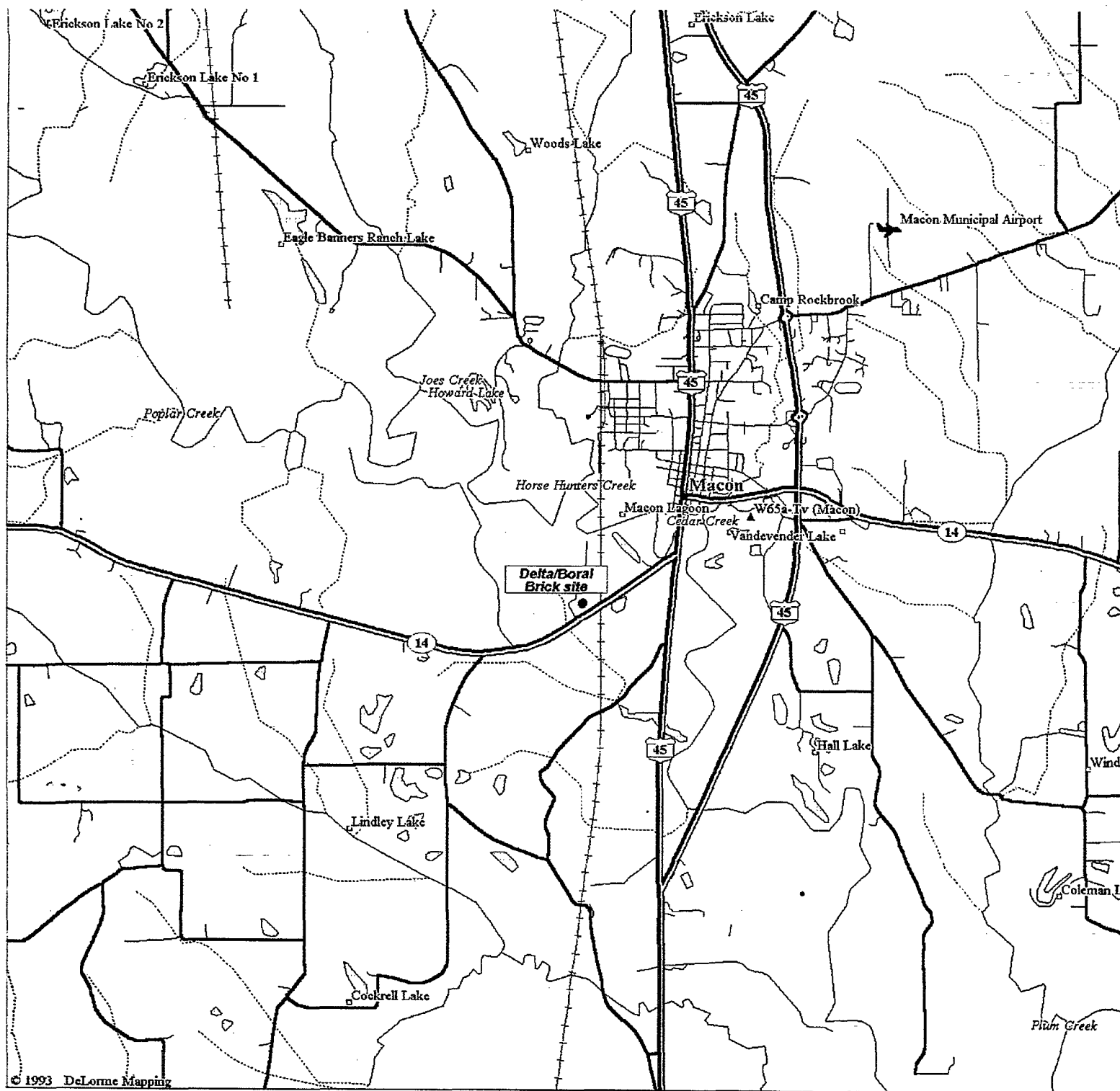
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No action has occurred recently due to budget constraints but the trip will take place as soon as travel monies are made available.



LEGEND

- State Route
- Geo Feature
- ◆ Town, Small City
- ▲ Hill
- US Highway
- Airfield
- Population Center

- Street, Road
- Hwy Ramp
- Major Street/Road
- State Route
- US Highway
- +++ Railroad
- River

- Intermittent River
- Airfield
- Utility (powerline)
- Open Water

Delta/Boral Brick Company Site
Mag 13.00
Mon Dec 04 22:05:11 1995

Scale 1:62,500 (at center)

1 Miles

2 KM

PRELIMINARY ASSESSMENT
DELTA/BORAL BRICK COMPANY
MSD985975473
MACON, NOXUBEE COUNTY, MISSISSIPPI

PREPARED BY:

ALD F. FOREE

Barry
Mr. Storer
Plant mgr.
Pete Papas
Quality Control Manager

DELTA BRICK
A Division of Boral Bricks, Inc.
Route 4, Box 2
Macon, Mississippi 39341
Telephone (601) 726-4236
Facs (601) 726-2677

NOT COMPLETED
TO STATE

(ASSIGNED
FOR FY 96

BJ

8/8/96

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Section

1. INTRODUCTION
2. SITE DESCRIPTION, OPERATIONAL HISTORY AND WASTE CHARACTERISTICS
 - 2.1 Location
 - 2.2 Site Description and Operational History
 - 2.3 Waste Characteristics
3. GROUNDWATER PATHWAY
 - 3.1 Hydrogeologic Setting
 - 3.2 Groundwater Targets
 - 3.3 Groundwater Conclusions
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 - 4.2 Surface Water Targets
 - 4.3 Surface Water Conclusions
5. SOIL EXPOSURE AND AIR PATHWAYS
 - 5.1 Physical Conditions
6. RECOMMENDATIONS/CONCLUSIONS
7. REFERENCES

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|-----------|-----------------------------------|
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| Figure 2. | Site Layout Map |
| Figure 3. | Topography Map [w/ 4-mile radius] |

DATE: December 4, 1995

PREPARED BY: Gerald F. Foree
U.S. Environmental Protection Agency

SITE: Delta/Boral Brick Company
Macon, Noxubee County, Mississippi
EPA ID No. MSD985975473
Lan ID No. 6413

1. INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), a Preliminary Assessment (PA) was conducted at the Delta/Boral Brick Company, Macon, Noxubee County, Mississippi. The purpose of this investigation was to collect sufficient information to assess the threat posed to human health and the environment. Determining the need for additional investigations included a review of available file information and a comprehensive target survey.

2. SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

2.1 LOCATION

Delta/Boral Brick Company is located on Highway 14 West, Macon, Noxubee County, Mississippi, County Code 103, and Congressional District 03. The site is located approximately one and a half miles south of downtown Macon. ^{Figure 1} The geographic coordinates are N 33° 05' 37.0" latitude and W 88° 34' 25.0" longitude.

2.2 SITE DESCRIPTION AND OPERATIONAL HISTORY

The Delta/Boral Brick Company site is approximately 27 acres. This consist of two buildings and a settling pond. Delta/Boral Brick Company has been in operation since 1959. The company produces and distributes bricks. [approximately 90 million bricks per year].
REFERENCE 1

2.3 WASTE CHARACTERISTICS

The only hazardous waste that was generated [up until 6 years ago] was lead which was used in the paints. REFERENCE 1

3. GROUNDWATER PATHWAY

3.1 HYDROGEOLOGIC SETTING

The two major groups of soils in Noxubee County belong to the red and yellow Podzolic soil which cover much of the county, and are found characteristically throughout an extensive region in the south eastern part of the U.S., including most of the Coastal Plain, much of the Piedmont, the Ozark Plateau and southern ends of Appalachia Plateau and Limestone Valleys. REFERENCE 2,3

Macon is located on a relatively flat area. The soils are usually thin and have limited profile development. They have sandy surfaces over friable sandy material. Gravel occurs through these soils in local areas. Some of the soils are heavy, tough acid clays. REFERENCE 2,3

The potentially threatened aquifer is the Eutaw-McShan. It is the most widely used aquifer and has the greatest potential for groundwater development throughout northeast Mississippi. The Eutaw-McShan aquifer is composed of fine to medium glauconitic sand interbedded with shale and clay. It is overlain and confined by the Mooreville chalk. Domestic and other small wells are completed in the Eutaw-McShan aquifer throughout much of the northeastern portion of the state. Large capacity wells for municipal and industrial use have been completed in the Eutaw-McShan aquifer at many locations. The average yield for this aquifer is about 250 - 500 gpm. REFERENCE 2,3

3.2 GROUNDWATER TARGETS

There are five wells located within the target area. However, only three are active. (See figure 3) These wells serve the city of Macon and four additional industrial connections. There are approximately 15,000 connections. This includes all the city of Macon, approximately 2256 people and a portion of the remaining Noxubee County, approximately 12604 people total. There are no know private wells, however, it is suspected that some exist and are used for purposes other than drinking. REFERENCE 4,6,7

3.3 GROUNDWATER CONCLUSIONS

There is no evidence of an observed and/or suspected release of hazardous waste to the AOC (Aquifer of Concern).

4. SURFACE WATER PATHWAY

4.1 HYDROLOGIC SETTING

Overland flow generally travels north approximately 1/2 mile to the Noxubee River. However, during heavy flooding, overland flow will also flow southwest about 200 feet into an unnamed intermittent stream, which flows approximately 1.5 miles into the Noxubee River.

FIGURE 2

4.2 SURFACE WATER TARGETS

The Noxubee River is not a known fishery, however, it is suspected that recreational fishing may occur. There are no surface water intakes located along the 15-mile surface water target area.

4.3 SURFACE WATER CONCLUSIONS

Though surface water runoff is the migration concern, there is no evidence of and observed and/or suspected release to the surface water.

5 SOIL EXPOSURE AND AIR PATHWAYS

5.1 PHYSICAL CONDITIONS

The climate of Noxubee County is typical of the climate of regions of like latitude and distance from large bodies of water. Winter temperature is modified by southerly winds from the Gulf of Mexico, the average temperature for December, January and February being 48.80 F. The spring months; March, April, and May, having an average temperature of 64.30 F. and rainfall of 14.14 inches. Summer are warm months of steady but not extreme heat. The average temperature is 800 F. The annual total precipitation for this area was 53.0 inches. The mean annual lake evaporation is 44.0 inches making the net precipitation about 9.0 inches. REFERENCE 3

6 CONCLUSIONS/RECOMMENDATIONS

Delta/Boral Brick site is located in a rural area in northwestern Mississippi. It produces and distributes approximately 90 million bricks annually. There are no signs of groundwater or surface water contamination. Soil samples collected by EPA, Emergency Response and Removal Branch, TAT contractor, indicated moderate levels of lead contamination. However, the levels are below cleanup standards. REFERENCE 5 I recommend that Delta/Boral Brick site receive a No Further Remedial Action Planned, NFRAP, disposition.

REFERENCES

1. Record of Communication, from Gerald F. Foree, EPA, Region IV, to Barry Storer, Plant Manager, Delta/Boral Brick Company, 11/17/95.
2. Sources for Water Supplies in Mississippi, by B.E. Wasson, U.S. Geological Survey, revised 1986.
3. Mississippi State Geological Survey, Bulletin 84, Kemper County Geology, by Richard John Hughes, Jr. M.A., 1958.
4. Record of Communication, from Gerald F. Foree, EPA, Region IV, to Billy Whitehead, City of Macon Electric and Water Co., 11/17/95.
5. Summary of Activity to Date Memorandum, from R. Rosen, OSC, Emergency Response and Removal Branch, EPA, Region IV, to file, 10/12/95.
6. 1990 US Census Data for Noxubee County, Mississippi.
7. 1990 US Census Data for city of Macon, Mississippi.

REFERENCE 1

RECORD OF COMMUNICATION	<input checked="" type="checkbox"/> PHONE CALL <input type="checkbox"/> DISCUSSION <input type="checkbox"/> FIELD TRIP <input type="checkbox"/> CONFERENCE <input type="checkbox"/> OTHER (SPECIFY)	
	TO: Barry Storer Plant Manager 601/7264236	FROM: Delta Brick
		DATE: 11/17/95
		TIME:
SUBJECT: Delta/Boral Brick		
SUMMARY OF COMMUNICATION * been in operation since 1959 * approx. 130 people working * 27 acres w/ 2 buildings * produce approx. 90 million bricks/yr		
CONCLUSIONS, ACTION TAKEN OR REQUIRED		
INFORMATION COPIES TO:		

SOURCES FOR WATER SUPPLIES IN MISSISSIPPI

by B. E. Wasson
Hydrologist
U.S. Geological Survey

A COOPERATIVE STUDY SPONSORED BY THE
U. S. GEOLOGICAL SURVEY
and the

Mississippi Research and Development Center

JACKSON, MISSISSIPPI

REVISED 1986

Eutaw-McShan Aquifer

Geologic Data

Structure: The base of the Eutaw-McShan aquifer slopes generally to the west (fig. 43). Structure contours are generalized from Boswell (1977).

Outcrop area: Generalized from Belt and others (1945) and from Speer, Golden, and Patterson (1964).

Area of freshwater occurrence: About 7,500 square miles.

Lithologic character: Fine to medium glauconitic sand interbedded with shale and clay. The upper part of the aquifer is the Tombigbee Sand Member of the Eutaw Formation, commonly a massive glauconitic sand. The sand in the lower part of the Eutaw Formation is less glauconitic and more permeable than sand in the Tombigbee Sand Member. The McShan Formation, the basal part of the Eutaw-McShan aquifer, commonly consists of many layers of sand and clay.

Thickness: In the southern part of the area the Eutaw

and McShan Formations are each about 200 feet thick and the maximum combined thickness is about 420 feet. Both formations thin to the north (Boswell, 1977).

Confining beds:

Overlying beds: South of central Lee County the Mooreville Chalk overlies and confines the Eutaw-McShan aquifer. Northward the tongue of Mooreville Chalk that separates the Eutaw-McShan aquifer from the overlying Coffee Sand aquifer becomes thinner.

Underlying bed: In the northern part of the area, the Eutaw-McShan aquifer lies on Paleozoic rocks; elsewhere the Gordo Formation underlies the Eutaw-McShan aquifer. The upper part of the Gordo Formation commonly consists of thick beds of clay that separate the Gordo aquifer from the Eutaw-McShan aquifer.

Hydrologic atlas describing aquifer: The Eutaw-McShan aquifer in Mississippi (Boswell, 1977).

Areal water-resources reports: See map showing areas covered by reports (fig. 1) and selected references.

Outcrop generalized from Belt and others, 1945, and Speer and others, 1964. Structure contours generalized from Boswell, 1977.

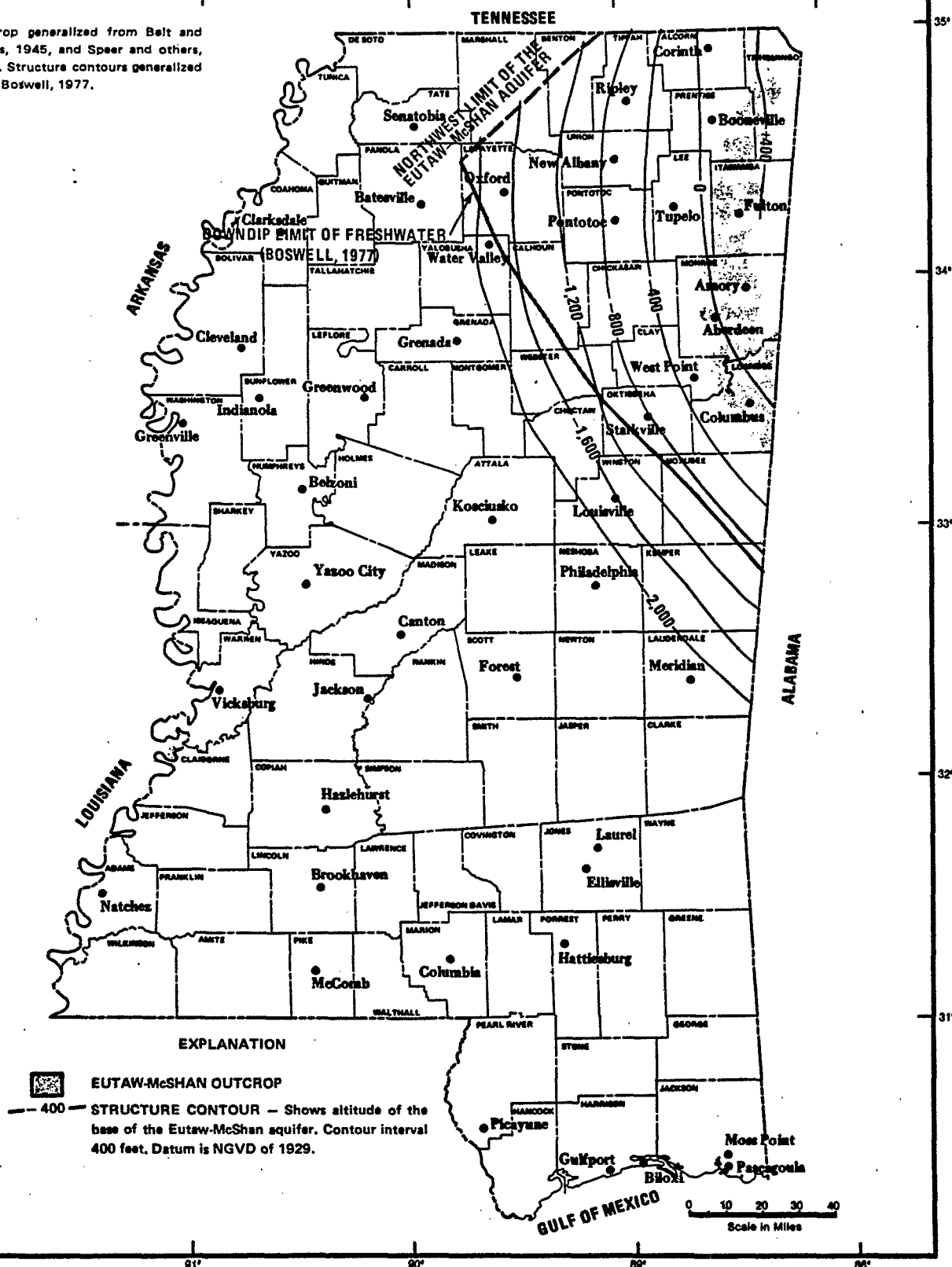


Figure 43. -- Configuration of the base of the Eutaw-McShan aquifer.

Eutaw-McShan Aquifer (Continued)

Hydrologic Data

Transmissivity: Hydraulic characteristics of the Eutaw-McShan aquifer are relatively uniform over a large area of the downdip part of the aquifer. Transmissivity increases from poor in the outcrop area to fair down the dip as the thickness of the aquifer approaches about 100 feet. In the northwestern part of the aquifer, transmissivity also increases from poor to fair as the thickness of the aquifer approaches about 100 feet. The transmissivity map (fig. 44) is based on aquifer tests and interpretation of geophysical logs. Transmissivity based on 41 aquifer tests ranged from 200 to 4,900 ft²/d (Boswell, 1977).

Largest well yields: A few public water-supply wells in the area yield about 600 gallons per minute.

Large pumping centers: Tupelo pumps about 7 Mgal/d. Pumpage from the Eutaw-McShan aquifer is about 3 Mgal/d at West Point and Aberdeen, and more than 1 Mgal/d at New Albany (Callahan, 1983).

Water use in 1980: About 27 Mgal/d (Callahan, 1983).

Potential sustained yield of the confined part of aquifer: 20 to 100 Mgal/d (based on data in table 3 and in figure 44). Boswell (1977) assumed specific conditions to calculate a potential yield of 40 Mgal/d.

Potentiometric maps: 1978 (Wasson, 1980a) and 1982 (Darden, 1985b).

Outcrop generalized from Belt and others, 1945, and Spear and others, 1964.

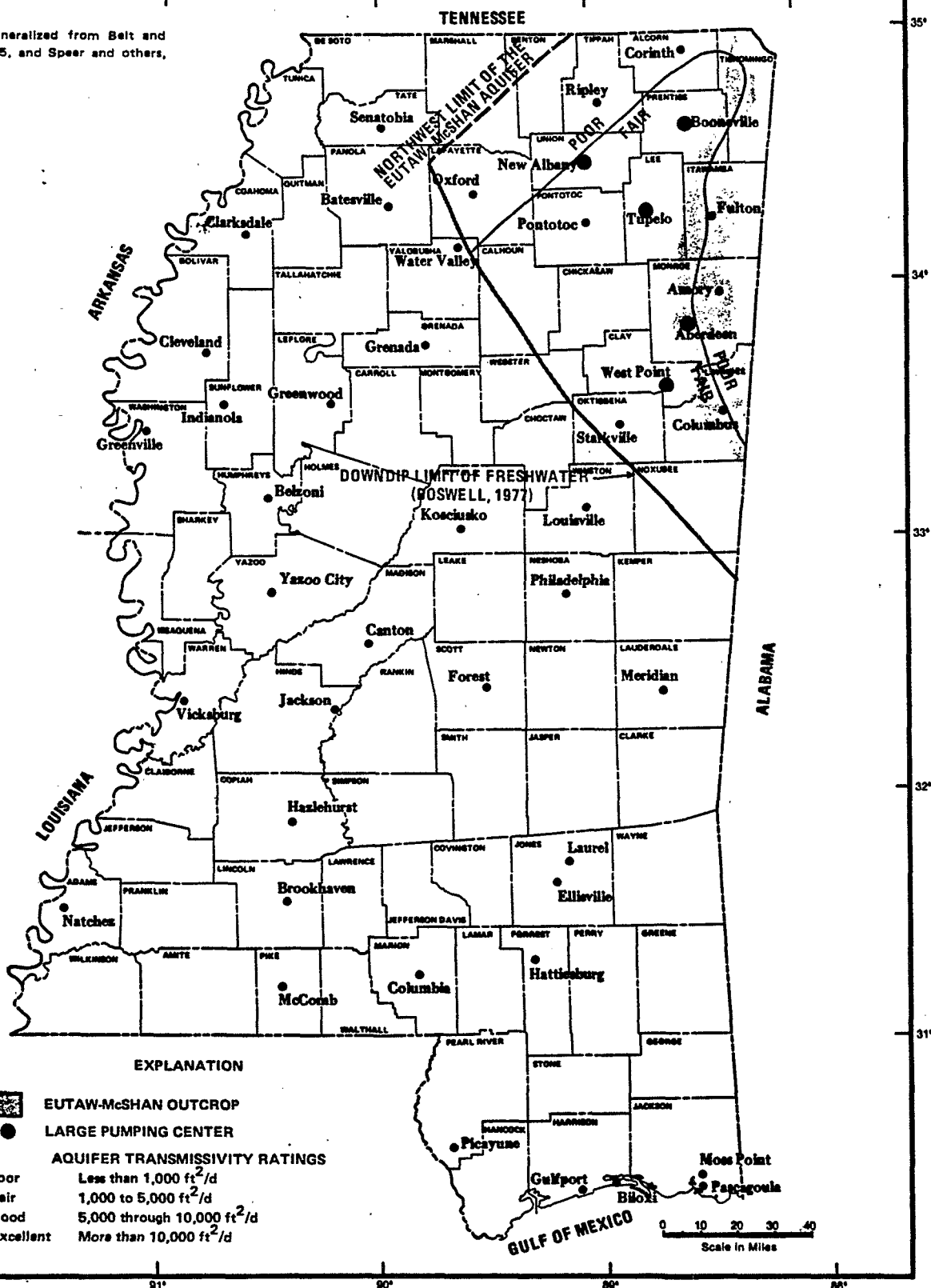


Figure 44. -- Transmissivity of the Eutaw-McShan aquifer.

Eutaw-McShan Aquifer (Continued)

Water-Quality Data

Dissolved-solids concentrations increase generally down the dip of the Eutaw-McShan aquifer (fig. 45). The distance from the outcrop area to the downdip

limit of freshwater is about 20 miles near the Alabama line and about 80 miles in north-central Mississippi.

Chemical quality of water in narrow zones of the aquifer along the 100-, 200-, 500-, and 1,000-mg/L lines of dissolved solids shown on the facing map is represented by typical chemical analyses in the following table:

Well, County	Depth (feet)	Date of collection	Silica	Iron	Calcium	Magnesium	Sodium	Potassium	Bicarbonate	Sulfate	Chloride	Fluoride	Dissolved solids (residue on evaporation at 180°C)	Hardness as Calcium, Magnesium CaCO ₃	Specific conductance (microhos at 25°C)	pH	Color
100-mg/L dissolved-solids zone																	
L79, Monroe	130	9/77	13	0.02	18	3.8	20	5.0	120	1.0	4.9	0.1	127	61	195	7.7	0
200-mg/L dissolved-solids zone																	
#15, Lee	282	6/58	20	.11	50	6.8	13	6.0	176	34	4.0	.0	217	153	362	7.4	--
500-mg/L dissolved-solids zone																	
N1, Lowndes	757	4/64	11	.27	9.0	.4	244	3.9	452	.4	130	.3	622	22	1,060	7.8	5
1,000-mg/L dissolved-solids zone																	
K5, Kemper	1,218	11/54	7.8	.30	2.6	1.1	383	4.7	366	1.2	370	2.0	959	11	1,710	8.1	5

Outcrop generalized from Belt and others, 1945, and Spear and others, 1964.

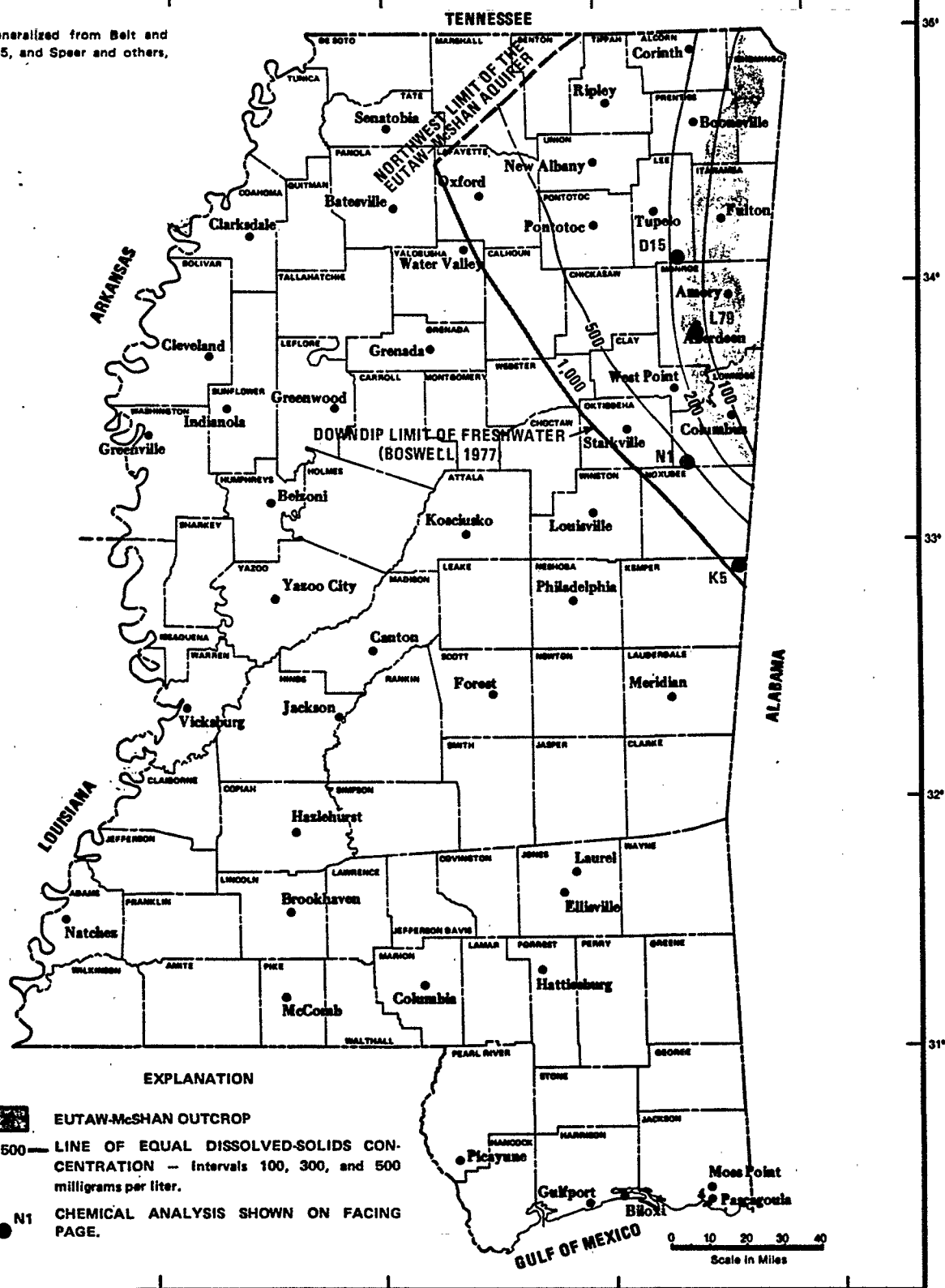
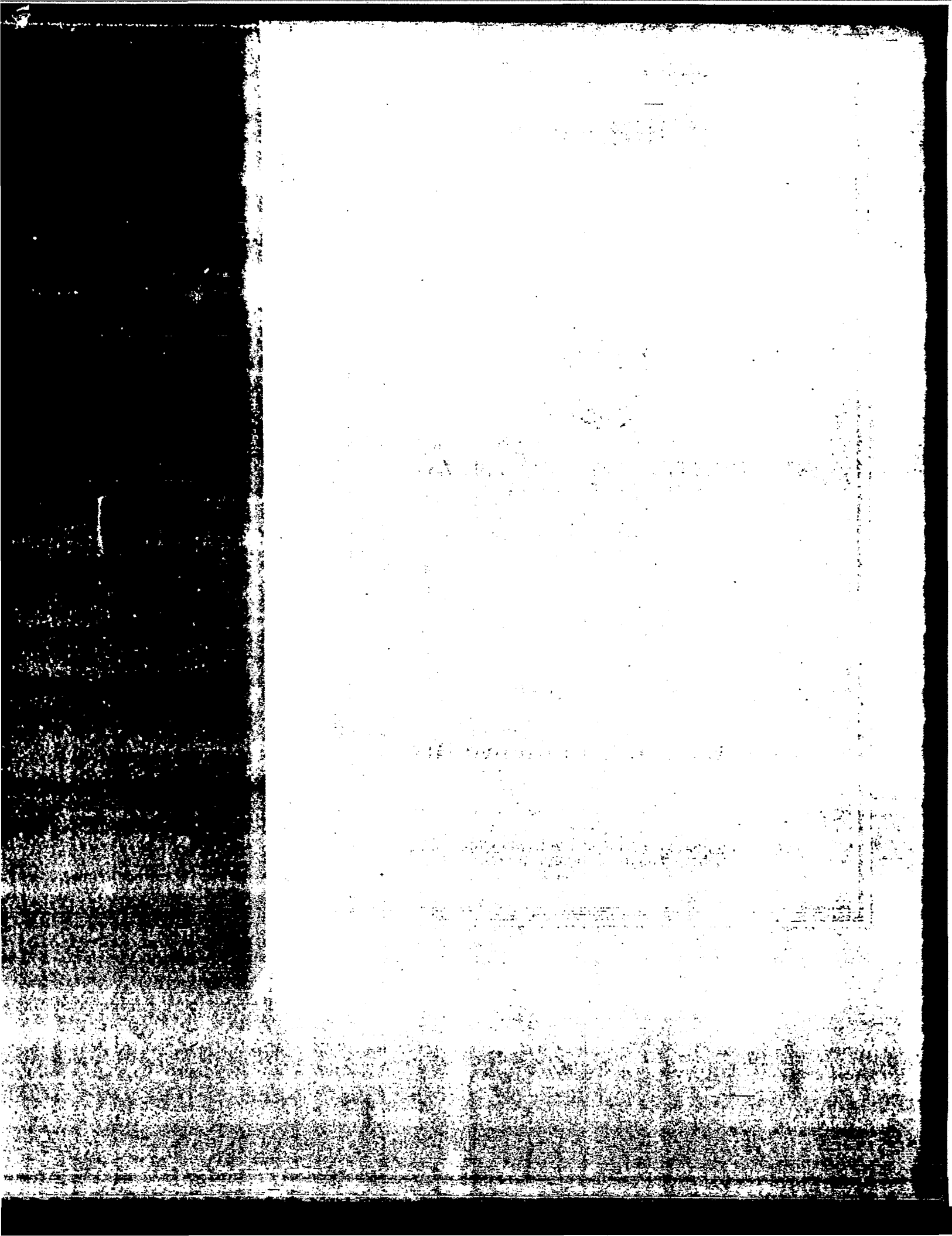


Figure 45. -- Dissolved-solids concentrations of water in the Eutaw-McShan aquifer.



Two miles southeast of Pontotoc, on the Houston road, at the base of a hill where the road forks, there is exposed a well-defined ledge of limestone several feet thick, showing an abundance of *Erogyra* and *Gryphea*. This limestone is overlain by 10 to 12 feet of stratified gray calcareous clay, which contains the same fossils. Above this clay in apparent unconformity, lies 25 to 30 feet of red clayey sand, doubtless of Clayton age.

A mile west of Pontotoc, on the Toccopola road, at a point where the road passes rather steeply down the east-facing slope (10 or 12 feet) into a small creek flat, the contact between the gray Porters Creek clay and the Clayton glauconitic fossiliferous marl (which weathers yellow-brown with a greenish cast when wet), shows a sharp and probably unconformable division. Some fragments of the limestone and of the yellowish indurated marl lie at the base of the slope. On the east side of the creek the slope shows similar relations between the two formations, but the clay disappears within a few rods and is seen no more toward Pontotoc. A mile north of this locality the road that leads westward toward Lafayette Springs reveals only the glauconitic marl of the Clayton for 2 miles out from Pontotoc. Just west of the residence of Mr. Henry Hardin cuts in the road reveal 3 or 4 feet of light gray Porters Creek clay overlying Clayton marl. For about half a mile to the west yellowish-red Clayton marls outcrop in the lowest places, but are hidden by the Porters Creek clay on the higher levels. Here, too, the line of contact is sharply marked. West of this locality the Clayton sinks beneath the level of the road even in the lowest places, and is seen no more, both the material and the topography being typically Flatwoods.

Houston.—One and one-half miles east of Houston the bluffs along Houlika River present the following exposure:

Eocene (Clayton formation):

- | | |
|--|-------|
| 3. The highest hills are capped by red sands of the same character as those at Pontotoc, New Albany, Blue Mountain, and Ripley | Feet |
| | 10-15 |

Cretaceous (Ripley):

- | | |
|---|----|
| 2. Light-gray sandy marl, passing into slightly more clayey upper layers. Distinctly stratified near upper surface at a point showing gray laminated sand | 50 |
| 1. Bluish-gray marl, with some grains of glauconite and sand.... | 12 |

Nos. 1 and 2 are distinctly fossiliferous, with an abundance of *Erogyra* and *Gypheae*. Smaller fossils, as sea urchins, *Ostrea plumosa*, and shark teeth are plentiful.

All this exposure except the capping of red calcareous sand is Cretaceous. The red sand caps all the ridges and hills between this point and Houston. Three-fourths of a mile east of Houston this sandy marl shows distinct stratification and in places is distinctly but not abundantly fossiliferous. This marl lies unconformably upon the Cretaceous deposits, and seems in all respects identical with what we have already described as Clayton.

On the branch railroad going west from Houston to Calhoun City the material exposed along the track is a slightly glauconitic yellowish clayey sand. No determinable fossils have been found in it, but it is apparently of Clayton age. West of the 1-mile board this material is replaced by the characteristic Porters Creek clay.

Other outcrops.—In an extensive area south of Houston the Clayton beds have not been found. Small outcrops may possibly be found but extensive outcrops will hardly be discovered in this area, and possibly the Porters Creek clay, which here lies in direct contact with the Selma chalk, may have so overlapped the Clayton beds as to cover them entirely.

A few feet of sandy marl overlies unconformably the Selma chalk 3 miles north by west of Shuqualak, in Noxubee County. This outcrop is noticeable at the bridge over a small creek on the Shuqualak and Macon road. At the time of examination the writer regarded this deposit as Ripley material but is now inclined to place it in the Midway. No fossils were seen.

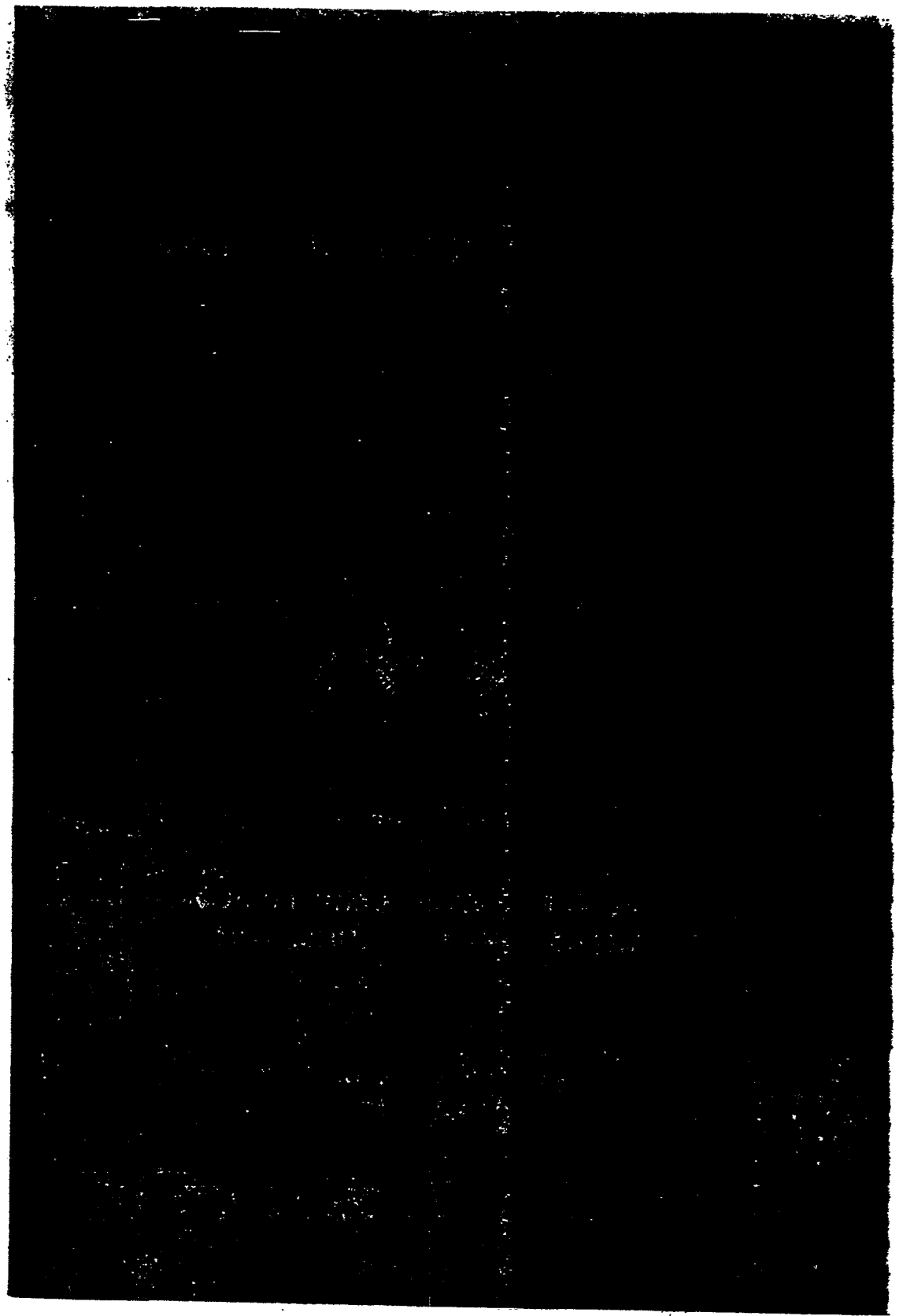
Fossils collected by Dr. C. Wythe Cooke 3 miles north of Scooba, Kemper County, were assigned by him to the Midway. The material containing the fossils was gray calcareous clay and was referred by him to the upper Clayton or basal Porters Creek. It must lie very near the Clayton-Porters Creek contact, and further detailed examination of the area might discover the Clayton under an altered physical aspect.

PORTERS CREEK CLAY

GENERAL FEATURES

Name.—The formation here called Porters Creek clay was called by Hilgard the "Flatwoods clay,"¹ and was placed by him at the base of the so-called "Northern Lignitic formation."

¹Hilgard, E. W., Report on the geology and agriculture of the State of Mississippi, pp. 110, 273. 1860.



The bleaching properties of this material are considerably improved by acid leaching (indicating bentonitic character), but the clay is not of commercial interest.

Sample 2 was taken from the middle of a road cut exposure 2.4 miles south of Sucarnoochee on United States Highway 45. At this locality the section consists of 12 feet of very dark gray brittle, very slightly arenaceous, thinly laminated clay. Although the bleaching action of this clay is improved by acid leaching, the quality is not equal to the commercial standards.

Sample 3 was obtained near the base of a 25-foot section exposed in a road cut along United States Highway 45, 1.7 miles south of Porterville. The clay is mottled chocolate-brown and black, hard and brittle, very slightly arenaceous, and finely micaceous. This sample is not of commercial interest. The fact that the bleaching power and color separation of the clay are distinctly increased by partial acid leaching is probably indicative of a rather high proportion of admixed bentonitic material.

NOXUBEE COUNTY

The Porters Creek clay extends across the southwestern part of Noxubee County. A thick exposure 3.9 miles west of Machulaville was visited. A road cut along State Highway 14 reveals 20 feet of dark to brownish-gray, hard and brittle, somewhat waxy, noncalcareous clay. A sample procured from the middle of this exposure gave the following bleach rating:

RAW				ACID-TREATED			
GR.	YEL.	RED	BL.	GR.	YEL.	RED	BL.
0.4	0.5	0.7	0.7	1.0	1.3	1.8	2.1

The natural bleaching power of this sample is low, but the acid-treated fraction is somewhat better, although it does not meet commercial requirements.

A thin bed of Porters Creek clay is exposed in a road cut on State Highway 14, 7.6 miles west of the intersection of that road with United States Highway 45. At this location 4 feet of very dark gray to black thin-bedded brittle slightly sandy, noncalcareous clay is exposed. The bleaching test made on a sample collected near the base of this exposure gave the following ratings:

RAW				ACID-TREATED			
GR.	YEL.	RED	BL.	GR.	YEL.	RED	BL.
0.4	0.5	0.6	0.6	0.9	1.2	1.3	1.4

This material is of no commercial interest.

OKTIBBEHA COUNTY

The Porters Creek clay crops out widely over the western half of Oktibbeha County, but only a single exposure was examined. The section visited is 3.8 miles west of Starkville on United States Highway 81 and consists of 6 feet of dark-gray hard and brittle arenaceous, glauconitic, finely micaceous, slightly calcareous clay. That this material is not of commercial interest as a bleaching clay is revealed in the following bleach rating:

RAW				ACID-TREATED			
GR.	YEL.	RED	BL.	GR.	YEL.	RED	BL.
0.5	0.6	0.7	0.7	0.8	1.1	1.3	1.5

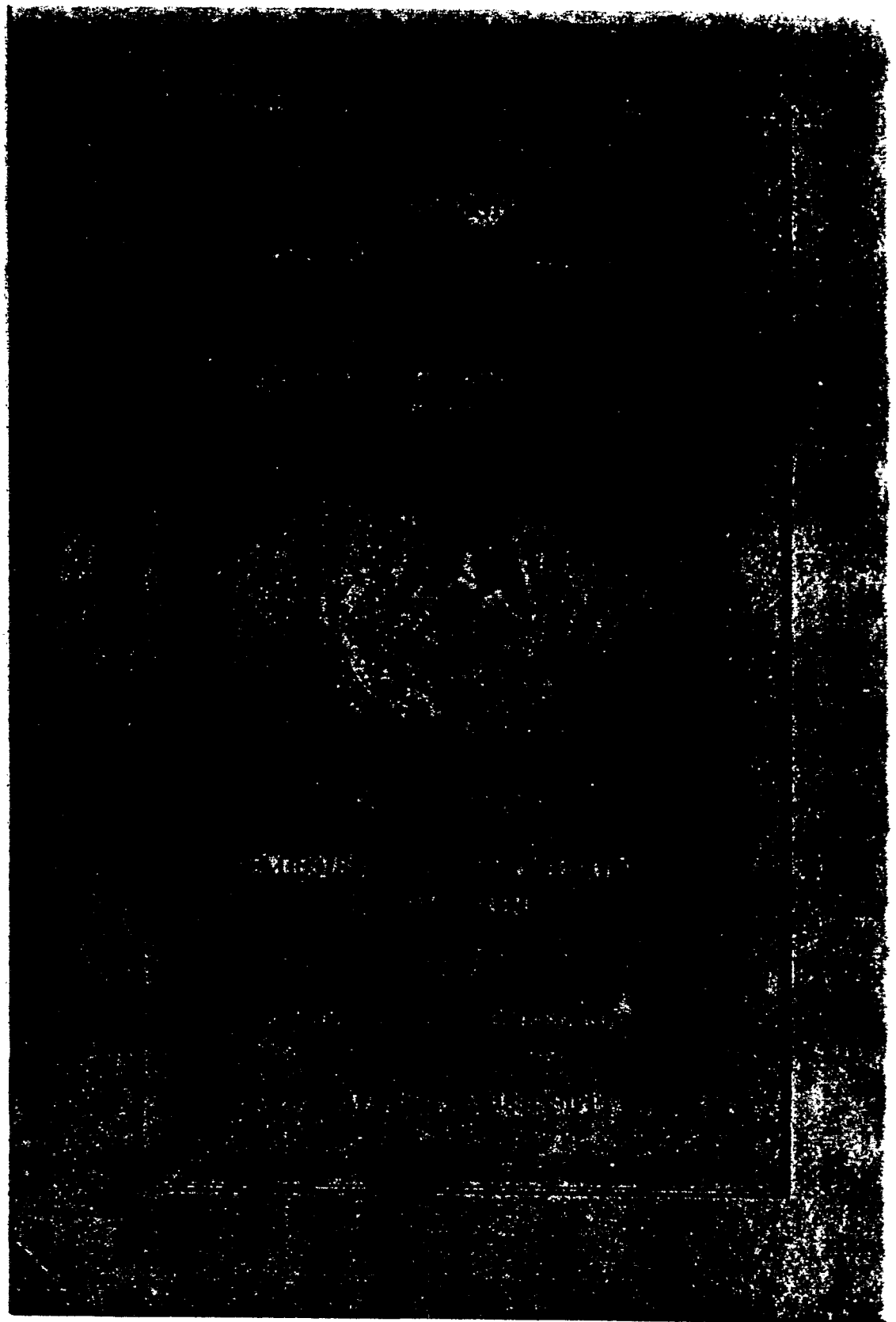
PONTOTOC COUNTY

The Porters Creek clay crops out in a north to south belt across west-central Pontotoc County.

A bore hole 0.1 mile east of Mudcreek (Springville), in the SW $\frac{1}{4}$, Sec. 4, T. 10 S., R. 2 E., penetrated 17 feet of light-brown to gray hard and brittle slightly arenaceous waxy clay. A representative sample, collected at a depth of 10 feet, yielded the following bleach rating:

RAW				ACID-TREATED			
GR.	YEL.	RED	BL.	GR.	YEL.	RED	BL.
0.5	0.6	0.6	0.7	0.8	1.2	1.4	1.6

The Porters Creek is not of commercial interest as a bleaching clay at this place.



AAA ton. However, by working only the lower interval, and possibly by working below the 7-foot auger hole, the quality can be held to a slightly higher level. The deposit of chalk, because of its location 5 miles northwest of Crawford, 14 miles west of Columbus, 10 miles south of West Point, and 8 miles east of Starkville is strategically located for development to serve Lowndes County and part of Clay and Oktibbeha Counties.

Property: Burgin Brothers (SW.1/4, SW.1/4, Sec. 30, T.19 N., R.16 E.), U. S. Highway 82, 3/4 mile from 45 W, 2 miles from the Gulf, Mobile, and Ohio Railroad Mayhew Station.

OKTIBBEHA COUNTY

STARKVILLE

The Prairie Bluff chalk is exposed around Starkville and westward. A composite sample of 12 feet of the chalk, C9, from the Stark property analyzed 72.56 percent CaCO_3 , necessitating a 2481-pound AAA ton as compared to a 2285-pound AAA ton on the Burgin property 10 miles to the east, a handicap that might be overcome by the nearby exclusively acid soils of the Flatwoods and North-Central Hills areas to the west.

Property: C. R. Stark, U. S. Highway 82, 1 1/2 miles west of Starkville.

NOXUBEE COUNTY

MACON ENVIRONS

The Prairie Bluff chalk in an outcrop 6 miles west of Macon (Highway 14) is the most accessible lime deposit to large areas in the Flatwoods and North-Central Hills of Noxubee and Winston Counties. The chalk, C13, analyzed 77.56 percent CaCO_3 , a better quality than farther north (C16, 72.56; C10, 70.81; C9, 72.56), requiring a 2321-pound AAA ton. The Prairie Bluff chalk at this place might possibly have to compete with the Selma (Demopolis member) chalk at Macon where a 50-foot interval tests 80.00, requiring only a 2250-pound AAA ton.

Property: 6 miles west of Macon, Highway 14 (paved 25 miles to Louisville).

KEMPER COUNTY

SCOOPA

The Prairie Bluff chalk is exposed along U. S. Highway 4 at a point 3 miles northwest of Scooba and 3 miles southeast of Wahalak, where a 9-foot composite sample of the chalk, M analyzed 77.56 percent CaCO_3 , necessitating a 2321-pound AAA ton. Although the chalk can be worked to a greater depth, the 9-foot chalk interval in the one small hill would yield 15,000 cubic yards by the removal of not more than 5 feet of overburden—and even this overburden contains 50 percent CaCO_3 which would be used advantageously on the Flatwoods farm within a radius of 2 or 3 miles. Other hills, both east and west show even greater quantities. The chalk in this area is the most favorably located deposit for Lauderdale, Neshoba, and Kemper Counties.

Property: Hill (NW.1/4, SE.1/4, Sec. 19, T.12 N., R.18 E.), 1/4 mile from the Gulf, Mobile, and Ohio Railroad, U. S. Highway 45, State Highway 16, which is gravelled through the Flatwoods.

WARREN COUNTY

The Vicksburg marls and limestones on the Laura Arche property, on Highway 3, 22 miles northeast of Vicksburg, cover a long narrow well-drained ridge. The marls and limestone have a workable thickness of approximately 30 feet, an estimate quantity of 375,000 cubic yards, and an overburden ranging from 1 to 30 feet but averaging about 10 feet. These marls and limestones in sample M2, from a ravine 1/2 mile southeast of the property, analyzed 77.06 percent CaCO_3 , perhaps typical of the material on the property, which is the most workable in the entire county and from which distribution can be made to all the counties of the lower Delta, particularly Yazoo and Warren.

The Vicksburg marls and limestones, sample M1, on the J. W. Culley property, 11 miles south of Vicksburg, near U. S. Highway 61, analyzed 89.59 percent CaCO_3 , which may be a trifle high, for only an 8-foot interval could be sampled. These marls and limestones, having a recoverable quantity of 50,000 cubic yards, are the only deposit of lime in south Warren County and

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LOCAL DETAILS

KEMPER COUNTY

Only the upper part of the Selma chalk, mainly the *Exogyra costata* zone including the *Exogyra cancellata* zone, appears at the surface in Kemper County, but the underlying *Exogyra ponderosa* zone is believed to be represented in a small area in the extreme northeastern corner of the county. However, no fossils known to be restricted to the *E. ponderosa* zone have been collected.

Numerous bald spots near Binnsville (Secs. 5 and 6, T.12 N., R.19 E.), show hard chalk containing fossils of the *Exogyra cancellata* zone.

Selma chalk equivalent in age to the Ripley formation in northern Noxubee County underlies a narrow belt along the southwestern edge of the belt of outcrop of the formation and is exposed in the lower part of a section on old U. S. Highway 45, on the hill south of Wahalak Creek (Secs. 4 and 9, T.12 N., R.18 E.). This section is described as a local detail in Kemper County under the heading "Prairie Bluff chalk."

NOXUBEE COUNTY

The Selma chalk is exposed over the northeast half of Noxubee County; the beds composing it strike about north-northwest.

Between Macon and the eastern edge of the Selma belt, a distance of 14 or 15 miles, bald spots and other exposures of Selma chalk are rare, the unweathered chalk being almost completely concealed by a blanket of residuum, the soils of which have been classified by the Bureau of Soils chiefly under the names Houston clay and Oktibbeha clay. This area typically represents the Black Prairie belt of the State.

That part of the formation below the Arcola limestone member is concealed at most places by dark-brown and black clay, residual from the chalk, and by terrace deposits of Tombigbee River. The limestone, about a foot thick, is well exposed on U. S. Highway 45 near the north edge of Sec. 15, T. 16 N., R. 18 E.; at Cliftonville on the north edge of Sec. 23, T. 16 N., R. 18 E.; in the NE 1/4 Sec. 30, T. 16 N., R. 19 E.; three-quarters of a mile east of Prairie Point in the northwest corner of Sec. 20, T.16 N., R.19 E.; and on the eastward-facing slope of a small branch in the SE.1/4, Sec. 4, T.14 N., R.19 E.

In a field one quarter mile east of the house on the old Allen Gavin place (NE.1/4, Sec. 30, T.16 N., R.19 E.), numerous shells of *Exogyra ponderosa* Roemer and several fragments of *Durania* sp.

(Coll. 6880) were found loose in the soil, having weathered from the underlying Selma chalk. Many blocks of weathered Arcola limestone are associated with the shells.

In Noxubee County the Arcola limestone member appears to be about 265 feet above the base of the Selma chalk, as shown in the well at Mr. Lewis C. Chapman's plantation, 2 1/2 miles north-northwest of Cliftonville.

LOG OF WELL OF LEWIS C. CHAPMAN (SEC. 3, T.16 N., R.18 E.)

	Thick- ness Feet	Depth Feet
Surface soil and clay	32	32
Selma chalk		
Chalk rock, firm and white on drying	148	180
Eutaw formation		
Sand, water-bearing	100	280
Clay	130	410
Sand, water-bearing	50	460
Clay	90	550
Sand, water-bearing	25	575
Tuscaloosa formation		
Red pipe clay	85	660
Sand (artesian water with 11-foot head)	65	725

The top of this well is 55 feet below an exposure of the Arcola limestone, about a mile southwest of the well. If the dip here is 3 feet to the mile, the top of the Arcola would be about 85 feet higher than the top of the well at the well site. This indicates a thickness of Selma below the Arcola limestone member of about 265 feet which is essentially the same thickness as found in wells in adjacent parts of Alabama.

Other wells near the outcrop of the Arcola reached the Eutaw at depths of 250 to 300 feet (21, p. 69; 21, p. 70).

The small but important bivalve species *Diploschiza cretacea* was observed in outcrops of the chalk at the following localities: On the westward-facing slope of Ash Creek at Cooksville (Sec. 17, T. 13 N., R. 19 E.); a tenth of a mile east of Center Point (Sec. 3, T. 14 N., R. 18 E.); three-tenths of a mile north of X Prairie (Sec. 16, T. 15 N., R.18 E.); and in bald spots 400 feet north of the road corner 11 1/2 miles north by east of Macon (SW.1/4, Sec. 1, T.16 N., R.17 E.).

SECTION SOUTH OF MOSSY CREEK

Soil	Feet
Reddish-yellow fine sand containing small ferruginous concretions.....	7
Porters Creek clay	
Chocolate-colored clay containing at base phosphatic molds of <i>Ostrea pulaskensis</i> Harris and other fossils.....	26
Unconformity (?)	
Clayton formation	
Light-gray sandy, glauconitic marl becoming somewhat indurated in basal one foot; contains phosphatic molds of <i>Ostrea pulaskensis</i> Harris in upper one foot and phosphatic molds of <i>Idonearca saffordi</i> (Gabb) and other fossils in the lower part.....	12
Unconformity	
Prairie Bluff chalk	
Hard massive brittle chalk to water level of lake (March 25, 1938) ..	11.5
	56.5

NOXUBEE COUNTY

The Prairie Bluff chalk appears at the surface in Noxubee County in a belt 2 to 3 miles wide from the northwest corner of the county in a south-southeasterly direction through Shuqualak to the Kemper County line. The formation consists of chalk of differing degrees of purity and is characterized by the presence of many phosphatic molds of mollusks at the base.

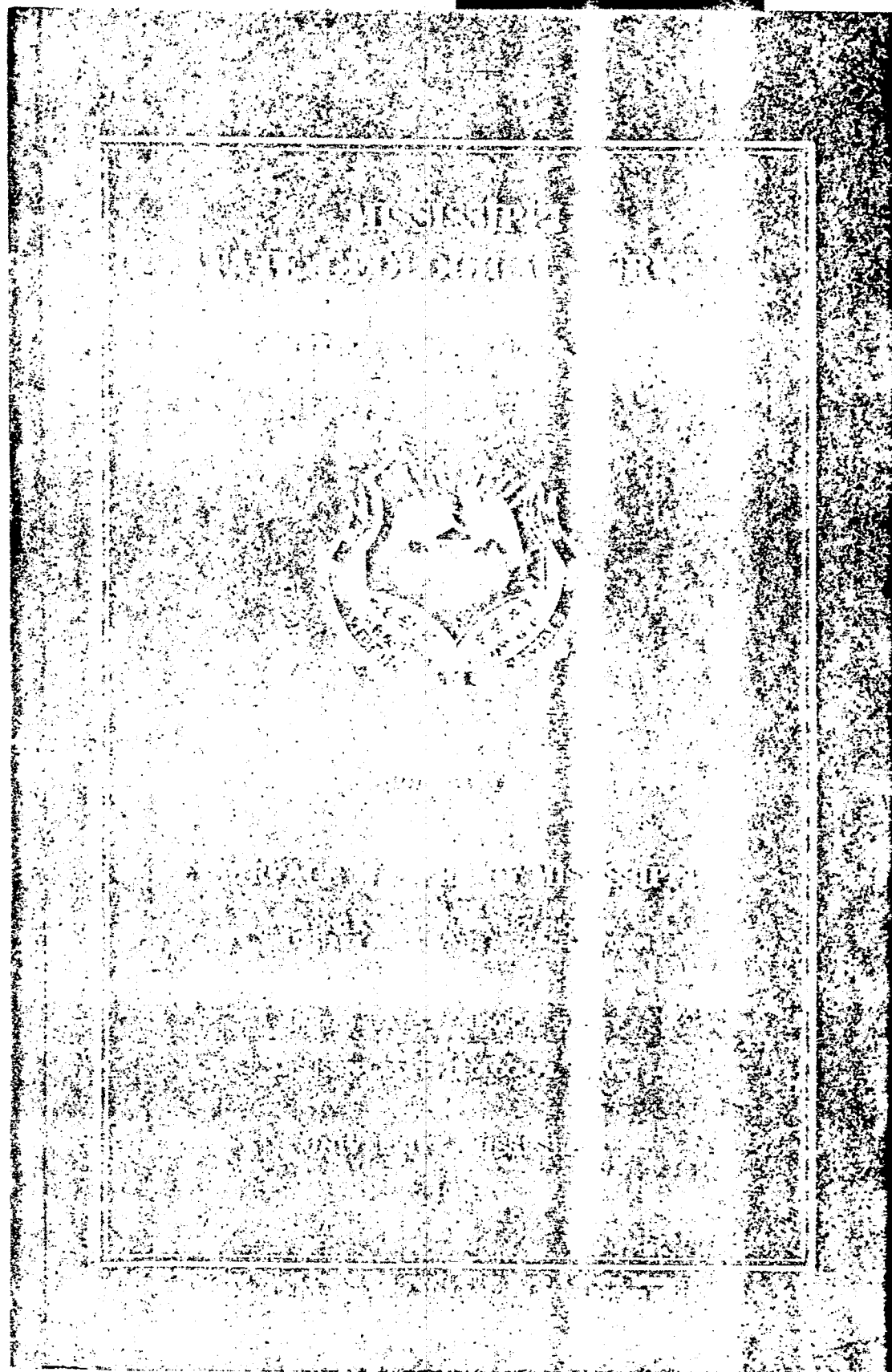
The Flatwoods, which is underlain by the Porters Creek clay of the Midway, is well developed immediately west of Shuqualak. North of the town several poor exposures of Prairie Bluff chalk were observed in the Macon road, and in a field west of the road a mile north of town the chalk is fairly well exposed in several bald spots; here were found the characteristic Upper Cretaceous fossils *Ostrea plumosa* Morton, *Gryphaeostrea vomer* (Morton), *Exogyra costata* Say, and *Pecten venustus* Morton (Coll. 6838). The town of Shuqualak is therefore situated approximately on the boundary between the Cretaceous and the Paleocene.

The Cretaceous-Paleocene contact was observed in the Macon-DeKalb road about half a mile north of the crossing of Running Water Creek and about 4 miles northwest of Shuqualak in a bald spot on the southward-facing slope of a small branch (NW.1/4, Sec. 36, T. 14 N., R.16 E.). (Figure 45.)

SECTION IN MACON-DE KALE ROAD, ABOUT 7 MILES SOUTH OF MACON, AND HALF A MILE NORTH OF THE CROSSING OF RUNNING WATER CREEK

Midway (Paleocene)	Feet
3. Dark greenish-gray compact calcareous clay containing <i>Foraminifera</i> and in the lower 3 to 5 feet large numbers of <i>Ostrea pulaskensis</i> Harris, identified by C. W. Cooke.....	8
2. Moderately hard bluish-gray somewhat sandy and argillaceous limestone. The upper 2 feet is a little harder than the lower portion and contains the following Paleocene (Midway) species: <i>Idonearca saffordi</i> (Gabb)?, <i>Venericardia alticostata</i> Conrad, <i>Turritella mortoni</i> Conrad, identified by C. W. Cooke; the basal portion weathers soft and a little shaly and contains <i>Gryphaeostrea vomer</i> (Morton)?, probably derived mechanically from the underlying Prairie Bluff chalk	6
Unconformity (indicated by some reworking of layer 1 in layer 2 and by borings in layer 1 filled by the darker materials of layer 2)	
Prairie Bluff chalk	
1. Gray very hard slightly sandy and argillaceous massive chalky limestone; <i>Baculites carinatus</i> Morton and <i>B. tippaensis</i> Conrad (Coll. 6836) were found loose on the surface near the upper part of this bed	4
	18

On the northward-facing slope of Dry Creek Valley (Sec. 18, T.14 N., R.17 E. and Sec. 13, T.14 N., R.16 E.), 4 miles southwest of Macon, are many bald spots of Prairie Bluff chalk containing abundant phosphatic molds of mollusks. Fossils were collected with the help of Mr. P. A. Bethany of Macon (Colls. 17242 and 17484). The contact of the Prairie Bluff chalk and Selma chalk is well exposed in a road cut at this locality. Fifteen feet of Selma is overlain by 25 feet of Prairie Bluff which is characterized by abundant glauconite, whereas the Selma has very little of this mineral. The unconformity is characterized by reworked fragments of Selma in the basal part of the Prairie Bluff and by borings as deep as 3 1/2 feet in the Selma, filled with glauconitic chalk of the Prairie Bluff. In two borings were found shells of *Diploschiza melleni* Stephenson, which had undoubtedly fallen in at the time the borings became filled with the calcareous ooze formed on the bottom of the Prairie Bluff sea.



NOXUBEE RIVER AT MACON

NOXUBEE COUNTY

LOCATION—Lat. 33°06'05", long. 88°33'40", in NE¼ sec. 4, T. 14 N., R. 17 E. Choctaw meridian, at bridge on U. S. Highway 45, in Macon, a quarter of a mile upstream from Cedar Creek, 1 mile downstream from Gulf, Mobile and Ohio Railroad bridge, 1½ miles downstream from Horse Hunters Creek, and 6¼ miles upstream from Running Water Creek.

DRAINAGE AREA—812 square miles.

RECORDS AVAILABLE—August 1928 to May 1932, September 1938 to September 1948.

AVERAGE DISCHARGE—13 years (1928-31, 1938-48), 813 second-feet.

GAGE—Prior to May 1932, chain gage at different datum; wire-weight gage at present datum Sept. 21 to Aug. 11, 1939; water-stage recorder thereafter. Datum of gage is 142.38 feet above mean sea level, datum of 1929 (levels by Corps of Engineers).

EXTREMES—Maximum discharge, 25,000 second-feet July 10, 1940; maximum gage height, 30.28 feet July 10, 1940; minimum discharge, 22 second-feet Aug. 25, 26, 1943 (gage height, 4.89 feet); minimum daily, 23 second-feet Aug. 26, 1943; minimum 7-day, 24.6 second-feet Aug. 24-30, 1943.

NOTE—A new maximum discharge of 50,600 second-feet (gage height, 32.74 feet) was established on Jan. 6, 1949.

REMARKS—Records good.

PEAK DISCHARGE—July 10, 1940 (8:00 p.m.) 25,000 second-feet; Feb. 11, 1946 (5:30 a.m.) 24,200 second-feet; Mar. 30, 1944 (8:00 a.m.) 23,400 second-feet; Feb. 21, 1945 (9:30 p.m.) 18,300 second-feet; Mar. 7, 1948 (8:30 p.m.) 12,100 second-feet.

DURATION OF FLOW—

Percent of time	Discharge second-feet	Percent of time	Discharge second-feet
	per sq. mile		per sq. mile
99	34	50	180
95	45	30	536
90	53	10	2,310
70	83	2	6,010
	0.042		0.222
	.056		.660
	.065		2.85
	.102		7.40

AVERAGE MONTHLY AND ANNUAL DISCHARGE IN SECOND-FEET

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1927-28													
1928-29	57.0	71.3	86.6	505	612	3,580	587	868	120	88.5	61.0	160	564
1929-30	65.5	1,730	858	1,290	985	1,580	247	2,840	101	78.0	106	152	838
1930-31	80.4	514	805	952	522	1,190	1,160	246	84.3	692	158	49.9	539
1931-32	69.2	73.8	1,560	2,800	3,730	732	1,300	489					
1938-39	38.5	64.0	88.2	902	4,201	1,922	1,753	884	1,696	355	198	118	993
1939-40	70.2	75.2	165	268	2,464	1,457	1,317	491	558	5,315	355	156	1,056
1940-41	74.4	232	1,667	549	1,037	1,626	795	113	64.8	753	165	81.5	596
1941-42	101	201	812	348	1,186	1,608	255	210	89.7	69.1	112	54.3	417
1942-43	42.4	55.4	255	167	293	1,727	458	186	68.0	55.1	36.5	45.7	284
1943-44	32.1	59.3	78.3	228	1,687	4,254	2,896	1,577	90.6	272	332	71.9	963
1944-45	42.5	63.6	413	996	5,228	2,643	981	305	124	174	69.9	49.9	895
1945-46	70.1	83.4	291	3,118	5,836	2,259	761	1,019	662	982	1,335	101	1,351
1946-47	74.9	722	426	4,853	799	1,718	2,412	452	1,154	177	65.3	58.3	1,078
1947-48	47.7	276	748	766	4,169	3,351	1,931	150	90.6	133	217	219	995

REFERENCE 4

RECORD OF COMMUNICATION	<input checked="" type="checkbox"/> PHONE CALL <input type="checkbox"/> DISCUSSION <input type="checkbox"/> FIELD TRIP <input type="checkbox"/> CONFERENCE <input type="checkbox"/> OTHER (SPECIFY)	
	TO: Billy Whitehead 601/ 7265251	FROM: City of Macon Electric and Water Co.
DATE: 11/17/95		
TIME:		
SUBJECT: Delta/Boral Brick Water supply		
SUMMARY OF COMMUNICATION <ul style="list-style-type: none">* 5 wells(municipal) w/in target area (3 active)* 10 million gallons/month pumped* Approx. 15,000 connections (city of Macon and 4 non industries)		
CONCLUSIONS, ACTION TAKEN OR REQUIRED		
INFORMATION COPIES TO:		

October 12, 1995

4WD-ERRB

MEMO

SUBJECT: Summary of Activity to Date
Delta Brick RAT/Site Assessment

FROM: R. Rosen, OSC *Max 10/12/95*
Emergency Response and Removal Branch

TO: File

Initial site visit was conducted on August 2, 1995 when OSC Rosen, MSDEQ Ken Whitten and EPA TATs Ron Stark and (can't remember name of second TAT) met with the property owner, Curtis Nicholson, in Macon, MS. We followed him to the site where Boral Brick now operates (formerly Delta Brick). Unbeknownst to the OSC, Nicholson had called several members of the media and they met us at the site. The OSC was careful to avoid aligning himself up with Nicholson since it was obvious Nicholson was trying to have himself seen as on the side of EPA.

After the media interviews, we prepared instruments and sample collection materials then followed Nicholson to his property. We walked north beyond the Boral brick storage yard, then worked our way north and west into the woods north of the yard. We then took 15 to 20 readings on a hand held XRF unit called an "X-Met". Readings generally showed 2,000 to 9,000 ppm lead in soil. We collected eight soil samples from representative areas (i.e., hot samples) and later had them analyzed by TAT at their Pelham site in Georgia, using a bench mounted Spectrace XRF unit.

During sample collection and XRF shoots, the OSC repeatedly asked Nicholson if he was sure we were on his property. During past MSDEQ investigations, samples were obtained and investigations conducted, allegedly on Nicholson's property, but in fact not on his property. Whether Nicholson simply didn't know his property lines or ignored them is unknown, but was documented by DEQ. Nicholson kept saying, "yes", meaning we were clearly on his property.

After returning to our vehicles and leaving Nicholson, Rosen and Whitten went to Boral Brick and met with the facility manager, Mr. Barry Storer. We discussed what we were doing behind his facility and also mentioned the lead levels detected on the X-Met. He claimed to have called Nicholson a number of times to offer to buy Nicholson's landlocked property behind Boral, but Nicholson refused to talk to him. Storer then showed us aerial photos and survey maps of their property and it was

very obvious that we never got close to Nicholson's property.

Subsequently, the samples were analyzed and found to have very low levels of lead, from non-detect to 83 ppm with one sample as high as 261 ppm. A letter explaining the results was prepared and sent to Nicholson after he failed to make himself available for a conference call set up by Gerald Foree. Nicholson later called Foree and complained about an EPA cover-up but Rosen did not participate in that call.

Rosen plans to return to Macon and sample on Nicholson's actual property in order to complete this investigation. Since Boral Brick was the alleged source of lead contamination, it seems highly unlikely that we will find contamination further north of Boral than where we already sampled. However, Rosen plans to broaden the sampling parameters to include VOA, Semi-VOA, PCB/Pesticides and RCRA Metals. A precondition set forth in the letter to Nicholson requires him to have property lines surveyed and flagged prior to EPA's arrival.

No action has occurred recently due to budget constraints but the trip will take place as soon as travel monies are made available.

1990 US Census DataURL: <http://www.census.gov/cdrom/lookup>

Database: C90STF1A

Summary Level: State--County

Noxubee County: FIPS.STATE=28, FIPS.COUNTY90=103**PERSONS**

Universe: Persons

Total.....12604

FAMILIES

Universe: Families

Total.....3092

HOUSEHOLDS

Universe: Households

Total.....4140

URBAN AND RURAL

Universe: Persons

Urban:

Inside urbanized area.....0

Outside urbanized area.....0

Rural.....0

Not defined for this file.....12604

SEX

Universe: Persons

Male.....5925

Female.....6679

RACE

Universe: Persons

White.....3959

Black.....8588

American Indian, Eskimo, or Aleut.....44

Asian or Pacific Islander.....10

Other race.....3

DETAILED RACE

Universe: Persons

White (800-869, 971).....3959

Black (870-934, 972).....8588

American Indian, Eskimo, or Aleut (000-599, 935-970, 973-975):

American Indian (000-599, 973).....44

Eskimo (935-940, 974).....0

Aleut (941-970, 975).....0

Asian or Pacific Islander (600-699, 976-985):

Asian (600-652, 976, 977, 979-982, 985):

Chinese (605-607, 976).....0

Filipino (608, 977).....0

Japanese (611, 981).....5

Asian Indian (600, 982).....0

Korean (612, 979).....1

Vietnamese (619, 980).....0

Cambodian (604).....0

Hmong (609).....0

Laotian (613).....0

Thai (618).....0

Other Asian (601-603, 610, 614-617, 620-652, 985).....1

Pacific Islander (653-699, 978, 983, 984):	
Polynesian (653-659, 978, 983):	
Hawaiian (653, 654, 978).....	0
Samoan (655, 983).....	3
Tongan (657).....	0
Other Polynesian (656, 658, 659).....	0
Micronesian (660-675, 984):	
Guamanian (660, 984).....	0
Other Micronesian (661-675).....	0
Melanesian (676-680).....	0
Pacific Islander, not specified (681-699).....	0
Other race (700-799, 986-999).....	3
PERSONS OF HISPANIC ORIGIN	
Universe: Persons of Hispanic origin	
Total.....	27
HISPANIC ORIGIN	
Universe: Persons	
Not of Hispanic origin.....	12577
Hispanic origin:	
Mexican.....	10
Puerto Rican.....	1
Cuban.....	0
Other Hispanic.....	16
HISPANIC ORIGIN BY RACE	
Universe: Persons	
Not of Hispanic origin	
White.....	3952
Black.....	8575
American Indian, Eskimo, or Aleut.....	44
Asian or Pacific Islander.....	6
Other race.....	0
Hispanic origin:	
White.....	7
Black.....	13
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	4
Other race.....	3
AGE	
Universe: Persons	
Under 1 year.....	215
1 and 2 years.....	454
3 and 4 years.....	495
5 years.....	262
6 years.....	228
7 to 9 years.....	747
10 and 11 years.....	538
12 and 13 years.....	457
14 years.....	208
15 years.....	217
16 years.....	209
17 years.....	234
18 years.....	236
19 years.....	209
20 years.....	182
21 years.....	161
22 to 24 years.....	507
25 to 29 years.....	918
30 to 34 years.....	982
35 to 39 years.....	802
40 to 44 years.....	618
45 to 49 years.....	495

50 to 54 years.....	536
55 to 59 years.....	526
60 and 61 years.....	172
62 to 64 years.....	314
65 to 69 years.....	454
70 to 74 years.....	412
75 to 79 years.....	353
80 to 84 years.....	255
85 years and over.....	208

SEX BY MARITAL STATUS

Universe: Persons 15 years and over

Male

Never married.....	1454
Now married, except separated.....	2059
Separated.....	183
Widowed.....	207
Divorced.....	195

Female

Never married.....	1440
Now married, except separated.....	2060
Separated.....	289
Widowed.....	850
Divorced.....	263

HOUSEHOLD TYPE AND RELATIONSHIP

Universe: Persons

In family households:

Householder.....	3092
Spouse.....	1971
Child:	
Natural-born or adopted.....	4710
Step.....	132
Grandchild.....	806
Other relatives.....	572
Nonrelatives.....	178

In nonfamily households:

Householder living alone.....	1000
Householder not living alone.....	48
Nonrelatives.....	63

In group quarters:

Institutionalized persons.....	20
Other persons in group quarters.....	12

Filler.....

HOUSEHOLD SIZE AND HOUSEHOLD TYPE

Universe: Households

1 person:

Male householder.....	404
Female householder.....	596

2 or more persons:

Family households:

Married-couple family:

With related children.....	1059
No related children.....	912

Other family:

Male householder, no wife present:

With related children.....	103
No related children.....	81

Female householder, no husband present:

With related children.....	684
No related children.....	253

Nonfamily households:

Male householder.....	31
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Female householder.....17

PERSONS IN FAMILIES

Universe: Persons in families

Total.....11283

PERSONS PER FAMILY

Universe: Families

Persons per family.....3.65

AGE OF HOUSEHOLD MEMBERS BY HOUSEHOLD TYPE

Universe: Households

Households with 1 or more persons under 18 years

Family households:

Married-couple family.....1061

Other family:

Male householder, no wife present.....107

Female householder, no husband present.....685

Nonfamily households:

Male householder.....6

Female householder.....2

Households with no persons under 18 years

Family households:

Married-couple family.....910

Other family:

Male householder, no wife present.....77

Female householder, no husband present.....252

Nonfamily households:

Male householder.....429

Female householder.....611

RACE OF HOUSEHOLDER BY HOUSEHOLD TYPE (8)

Universe: Households

White

Family households:

Married-couple family:

With related children.....447

No related children.....572

Other family:

Male householder, no wife present:

With related children.....17

No related children.....21

Female householder, no husband present:

With related children.....23

No related children.....60

Nonfamily households:

Householder living alone.....427

Householder not living alone.....8

Black

Family households:

Married-couple family:

With related children.....604

No related children.....339

Other family:

Male householder, no wife present:

With related children.....86

No related children.....60

Female householder, no husband present:

With related children.....658

No related children.....192

Nonfamily households:

Householder living alone.....571

Householder not living alone.....40

American Indian, Eskimo, or Aleut

Family households:

Married-couple family:	
With related children.....	7
No related children.....	0
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	2
No related children.....	1
Nonfamily households:	
Householder living alone.....	1
Householder not living alone.....	0
Asian or Pacific Islander	
Family households:	
Married-couple family:	
With related children.....	1
No related children.....	1
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	1
No related children.....	0
Nonfamily households:	
Householder living alone.....	0
Householder not living alone.....	0
Other race	
Family households:	
Married-couple family:	
With related children.....	0
No related children.....	0
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	0
No related children.....	0
Nonfamily households:	
Householder living alone.....	1
Householder not living alone.....	0

HOUSEHOLD TYPE (8)

Universe: *Households with householder of Hispanic origin*

Family households:	
Married-couple family:	
With related children.....	2
No related children.....	0
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	2
No related children.....	0
Nonfamily households:	
Householder living alone.....	1
Householder not living alone.....	0

HOUSEHOLD TYPE AND RELATIONSHIP

Universe: *Persons under 18 years*

In households:	
Householder or spouse.....	6
Own child:	
In married-couple family.....	1994
In other family:	
Male householder, no wife present.....	159
Female householder, no husband present.....	1195
Other relatives.....	863
Nonrelatives.....	47
In group quarters:	
Institutionalized persons.....	0
Other persons in group quarters.....	0
Filler.....	

RELATIONSHIP AND AGE

Universe: Persons under 18 years

In households:	
Householder or spouse.....	6
Related child:	
Own child:	
Under 3 years.....	447
3 and 4 years.....	363
5 years.....	197
6 to 11 years.....	1235
12 and 13 years.....	388
14 years.....	178
15 to 17 years.....	540
Other relatives:	
Under 3 years.....	219
3 and 4 years.....	125
5 years.....	62
6 to 11 years.....	261
12 and 13 years.....	63
14 years.....	27
15 to 17 years.....	106
Nonrelatives:	
Under 3 years.....	3
3 and 4 years.....	7
5 years.....	3
6 to 11 years.....	17
12 and 13 years.....	6
14 years.....	3
15 to 17 years.....	8
In group quarters:	
Institutionalized persons:	
Under 3 years.....	0
3 and 4 years.....	0
5 years.....	0
6 to 11 years.....	0
12 and 13 years.....	0
14 years.....	0
15 to 17 years.....	0
Other persons in group quarters:	
Under 3 years.....	0
3 and 4 years.....	0
5 years.....	0
6 to 11 years.....	0
12 and 13 years.....	0
14 years.....	0
15 to 17 years.....	0
Filler.....	

HOUSEHOLD TYPE AND RELATIONSHIP

4 persons.....	1
5 persons.....	1

Universe: Persons 65 years and over

In family households:

Householder.....	644
Spouse.....	309
Other relatives.....	126
Nonrelatives.....	6

In nonfamily households:

Male householder:

Living alone.....	141
Not living alone.....	7

Female householder:

Living alone.....	420
Not living alone.....	7
Nonrelatives.....	10

In group quarters:

Institutionalized persons.....	11
Other persons in group quarters.....	1

Filler.....

AGE OF HOUSEHOLD MEMBERS (2) BY HOUSEHOLD SIZE AND HOUSEHOLD TYPE

Universe: Households

Households with 1 or more persons 60 years and over

1 person.....	662
2 or more persons:	
Family households.....	947
Nonfamily households.....	18

Households with no persons 60 years and over

1 person.....	338
2 or more persons:	
Family households.....	2145
Nonfamily households.....	30

AGE OF HOUSEHOLD MEMBERS (3) BY HOUSEHOLD SIZE AND HOUSEHOLD TYPE

Universe: Households

Households with 1 or more persons 65 years and over

1 person.....	561
2 or more persons:	
Family households.....	739
Nonfamily households.....	16

Households with no persons 65 years and over

1 person.....	439
2 or more persons:	
Family households.....	2353
Nonfamily households.....	32

HOUSEHOLD TYPE

Universe: Households

Households with 1 or more nonrelatives.....	186
Households with no nonrelatives.....	3954

HOUSEHOLD TYPE AND HOUSEHOLD SIZE

Universe: Households

Family households:

2 persons.....	1025
3 persons.....	643
4 persons.....	608
5 persons.....	370
6 persons.....	190
7 or more persons.....	256

Nonfamily households:

1 person.....	1000
2 persons.....	39
3 persons.....	6
4 persons.....	1
5 persons.....	1

6 persons.....	1
7 or more persons.....	0
GROUP QUARTERS	
<i>Universe: Persons in group quarters</i>	
<i>Institutionalized persons (00I-99I):</i>	
Correctional institutions (20I-24I, 27I, 28I, 95I).....	9
Nursing homes (60I-67I).....	0
Mental (Psychiatric) hospitals (45I-48I).....	0
Juvenile institutions (01I-05I, 10I-12I, 15I).....	0
Other institutions (00I, 06I-09I, 13I, 14I, 16I-19I, 25I, 26I, 29.....	11
<i>Other persons in group quarters (00N-99N):</i>	
College dormitories (87N).....	0
Military quarters (96N-98N).....	0
Emergency shelters for homeless (82N, 83N).....	0
Visible in street locations (84N, 85N).....	0
Other noninstitutional group quarters (00N-81N, 86N, 88N-95N, 99N).....	12
PERSONS SUBSTITUTED	
<i>Universe: Persons</i>	
Not substituted.....	12519
<i>Substituted for:</i>	
Noninterview.....	85
Count adjustment.....	
IMPUTATION OF POPULATION ITEMS	
<i>Universe: Persons not substituted</i>	
No items allocated.....	9147
One or more items allocated.....	3372
IMPUTATION OF RELATIONSHIP	
<i>Universe: Persons not substituted</i>	
Allocated.....	574
Not allocated.....	11945
IMPUTATION OF SEX	
<i>Universe: Persons not substituted</i>	
Allocated.....	342
Not allocated.....	12177
IMPUTATION OF AGE	
<i>Universe: Persons not substituted</i>	
Allocated.....	366
Not allocated.....	12153
IMPUTATION OF RACE	
<i>Universe: Persons not substituted</i>	
Allocated.....	381
Not allocated.....	12138
IMPUTATION OF HISPANIC ORIGIN	
<i>Universe: Persons not substituted</i>	
Allocated.....	2692
Not allocated.....	9827
IMPUTATION OF MARITAL STATUS	
<i>Universe: Persons 15 years and over</i>	
Substituted.....	66
<i>Not substituted:</i>	
Allocated.....	306
Not allocated.....	8628
HOUSING UNITS	
<i>Universe: Housing units</i>	
Total.....	4645
OCCUPANCY STATUS	
<i>Universe: Housing units</i>	
Occupied.....	4140
Vacant.....	505
TENURE	
<i>Universe: Occupied housing units</i>	

Owner occupied.....	3236
Renter occupied.....	904

URBAN AND RURAL

Universe: Housing units

Urban:

Inside urbanized area.....	0
Outside urbanized area.....	0
Rural.....	0
Not defined for this file.....	4645

VACANCY STATUS

Universe: Vacant housing units

For rent.....	76
For sale only.....	50
Rented or sold, not occupied.....	33
For seasonal, recreational, or occasional use.....	83
For migrant workers.....	3
Other vacant.....	260

BOARDED-UP STATUS

Universe: Vacant housing units

Boarded up.....	22
Not boarded up.....	483

USUAL HOME ELSEWHERE

Universe: Vacant housing units

Vacant, usual home elsewhere.....	85
All other vacants.....	420

RACE OF HOUSEHOLDER

Universe: Occupied housing units

White.....	1575
Black.....	2550
American Indian, Eskimo, or Aleut.....	11
Asian or Pacific Islander.....	3
Other race.....	1

TENURE BY RACE OF HOUSEHOLDER

Universe: Occupied housing units

Owner occupied

White.....	1296
Black.....	1932
American Indian, Eskimo, or Aleut.....	6
Asian or Pacific Islander.....	2
Other race.....	0

Renter occupied

White.....	279
Black.....	618
American Indian, Eskimo, or Aleut.....	5
Asian or Pacific Islander.....	1
Other race.....	1

HISPANIC ORIGIN OF HOUSEHOLDER BY RACE OF HOUSEHOLDER

Universe: Occupied housing units

Not of Hispanic origin

White.....	1575
Black.....	2547
American Indian, Eskimo, or Aleut.....	11
Asian or Pacific Islander.....	2
Other race.....	0

Hispanic origin

White.....	0
Black.....	3
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	1
Other race.....	1

1990 US Census DataURL: <http://www.census.gov/cdrom/lookup>

Database: C90STF1A

Summary Level: State--Place

Macon city: FIPS.STATE=28, FIPS.PLACE90=44240**PERSONS**

Universe: Persons

Total.....2256

FAMILIES

Universe: Families

Total.....576

HOUSEHOLDS

Universe: Households

Total.....855

URBAN AND RURAL

Universe: Persons

Urban:

Inside urbanized area.....0

Outside urbanized area.....0

Rural.....0

Not defined for this file.....2256

SEX

Universe: Persons

Male.....1001

Female.....1255

RACE

Universe: Persons

White.....948

Black.....1299

American Indian, Eskimo, or Aleut.....4

Asian or Pacific Islander.....4

Other race.....1

DETAILED RACE

Universe: Persons

White (800-869, 971).....948

Black (870-934, 972).....1299

American Indian, Eskimo, or Aleut (000-599, 935-970, 973-975):

American Indian (000-599, 973).....4

Eskimo (935-940, 974).....0

Aleut (941-970, 975).....0

Asian or Pacific Islander (600-699, 976-985):

Asian (600-652, 976, 977, 979-982, 985):

Chinese (605-607, 976).....0

Filipino (608, 977).....0

Japanese (611, 981).....4

Asian Indian (600, 982).....0

Korean (612, 979).....0

Vietnamese (619, 980).....0

Cambodian (604).....0

Hmong (609).....0

Laotian (613).....0

Thai (618).....0

Other Asian (601-603, 610, 614-617, 620-652, 985).....0

Pacific Islander (653-699, 978, 983, 984):

Polynesian (653-659, 978, 983):

Hawaiian (653, 654, 978).....0

Samoan (655, 983).....0

Tongan (657).....0

Other Polynesian (656, 658, 659).....0

Micronesian (660-675, 984):

Guamanian (660, 984).....0

Other Micronesian (661-675).....0

Melanesian (676-680).....0

Pacific Islander, not specified (681-699).....0

Other race (700-799, 986-999).....1

PERSONS OF HISPANIC ORIGIN

Universe: Persons of Hispanic origin

Total.....6

HISPANIC ORIGIN

Universe: Persons

Not of Hispanic origin.....2250

Hispanic origin:

Mexican.....5

Puerto Rican.....0

Cuban.....0

Other Hispanic.....1

HISPANIC ORIGIN BY RACE

Universe: Persons

Not of Hispanic origin

White.....948

Black.....1298

American Indian, Eskimo, or Aleut.....4

Asian or Pacific Islander.....0

Other race.....0

Hispanic origin:

White.....0

Black.....1

American Indian, Eskimo, or Aleut.....0

Asian or Pacific Islander.....4

Other race.....1

AGE

Universe: Persons

Under 1 year.....40

1 and 2 years.....77

3 and 4 years.....86

5 years.....50

6 years.....40

7 to 9 years.....116

10 and 11 years.....86

12 and 13 years.....58

14 years.....33

15 years.....32

16 years.....35

17 years.....31

18 years.....43

19 years.....36

20 years.....28

21 years.....23

22 to 24 years.....83

25 to 29 years.....151

30 to 34 years.....186

35 to 39 years.....140

40 to 44 years.....96

45 to 49 years.....73

50 to 54 years.....	85
55 to 59 years.....	106
60 and 61 years.....	27
62 to 64 years.....	69
65 to 69 years.....	107
70 to 74 years.....	105
75 to 79 years.....	97
80 to 84 years.....	65
85 years and over.....	52

SEX BY MARITAL STATUS

Universe: Persons 15 years and over

Male	
Never married.....	240
Now married, except separated.....	367
Separated.....	28
Widowed.....	36
Divorced.....	41
Female	
Never married.....	273
Now married, except separated.....	368
Separated.....	52
Widowed.....	206
Divorced.....	59

HOUSEHOLD TYPE AND RELATIONSHIP

Universe: Persons

In family households:	
Householder.....	576
Spouse.....	354
Child:	
Natural-born or adopted.....	731
Step.....	33
Grandchild.....	138
Other relatives.....	81
Nonrelatives.....	28
In nonfamily households:	
Householder living alone.....	268
Householder not living alone.....	11
Nonrelatives.....	16
In group quarters:	
Institutionalized persons.....	20
Other persons in group quarters.....	0
Filler.....	

HOUSEHOLD SIZE AND HOUSEHOLD TYPE

Universe: Households

1 person:	
Male householder.....	79
Female householder.....	189
2 or more persons:	
Family households:	
Married-couple family:	
With related children.....	151
No related children.....	203
Other family:	
Male householder, no wife present:	
With related children.....	19
No related children.....	9
Female householder, no husband present:	
With related children.....	147
No related children.....	47
Nonfamily households:	
Male householder.....	7

Female householder.....	4
PERSONS IN FAMILIES	
Universe: Persons in families	
Total.....	1913
PERSONS PER FAMILY	
Universe: Families	
Persons per family.....	3.32
AGE OF HOUSEHOLD MEMBERS BY HOUSEHOLD TYPE	
Universe: Households	
Households with 1 or more persons under 18 years	
Family households:	
Married-couple family.....	151
Other family:	
Male householder, no wife present.....	19
Female householder, no husband present.....	147
Nonfamily households:	
Male householder.....	1
Female householder.....	0
Households with no persons under 18 years	
Family households:	
Married-couple family.....	203
Other family:	
Male householder, no wife present.....	9
Female householder, no husband present.....	47
Nonfamily households:	
Male householder.....	85
Female householder.....	193
RACE OF HOUSEHOLDER BY HOUSEHOLD TYPE (8)	
Universe: Households	
White	
Family households:	
Married-couple family:	
With related children.....	79
No related children.....	171
Other family:	
Male householder, no wife present:	
With related children.....	3
No related children.....	4
Female householder, no husband present:	
With related children.....	9
No related children.....	14
Nonfamily households:	
Householder living alone.....	161
Householder not living alone.....	2
Black	
Family households:	
Married-couple family:	
With related children.....	70
No related children.....	32
Other family:	
Male householder, no wife present:	
With related children.....	16
No related children.....	5
Female householder, no husband present:	
With related children.....	138
No related children.....	33
Nonfamily households:	
Householder living alone.....	107
Householder not living alone.....	9
American Indian, Eskimo, or Aleut	
Family households:	

Married-couple family:	
With related children.....	1
No related children.....	0
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	0
No related children.....	0
Nonfamily households:	
Householder living alone.....	0
Householder not living alone.....	0
Asian or Pacific Islander	
Family households:	
Married-couple family:	
With related children.....	1
No related children.....	0
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	0
No related children.....	0
Nonfamily households:	
Householder living alone.....	0
Householder not living alone.....	0
Other race	
Family households:	
Married-couple family:	
With related children.....	0
No related children.....	0
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	0
No related children.....	0
Nonfamily households:	
Householder living alone.....	0
Householder not living alone.....	0

HOUSEHOLD TYPE (8)

Universe: Households with householder of Hispanic origin

Family households:	
Married-couple family:	
With related children.....	1
No related children.....	0
Other family:	
Male householder, no wife present:	
With related children.....	0
No related children.....	0
Female householder, no husband present:	
With related children.....	0
No related children.....	0
Nonfamily households:	
Householder living alone.....	0
Householder not living alone.....	0

HOUSEHOLD TYPE AND RELATIONSHIP

Universe: Persons under 18 years

In households:	
Householder or spouse.....	1
Own child:	
In married-couple family.....	278
In other family:	
Male householder, no wife present.....	27
Female householder, no husband present.....	225
Other relatives.....	149
Nonrelatives.....	4
In group quarters:	
Institutionalized persons.....	0
Other persons in group quarters.....	0
Filler.....	

RELATIONSHIP AND AGE

Universe: Persons under 18 years

In households:	
Householder or spouse.....	1
Related child:	
Own child:	
Under 3 years.....	81
3 and 4 years.....	63
5 years.....	36
6 to 11 years.....	195
12 and 13 years.....	51
14 years.....	28
15 to 17 years.....	76
Other relatives:	
Under 3 years.....	35
3 and 4 years.....	23
5 years.....	13
6 to 11 years.....	46
12 and 13 years.....	6
14 years.....	5
15 to 17 years.....	21
Nonrelatives:	
Under 3 years.....	1
3 and 4 years.....	0
5 years.....	1
6 to 11 years.....	1
12 and 13 years.....	1
14 years.....	0
15 to 17 years.....	0
In group quarters:	
Institutionalized persons:	
Under 3 years.....	0
3 and 4 years.....	0
5 years.....	0
6 to 11 years.....	0
12 and 13 years.....	0
14 years.....	0
15 to 17 years.....	0
Other persons in group quarters:	
Under 3 years.....	0
3 and 4 years.....	0
5 years.....	0
6 to 11 years.....	0
12 and 13 years.....	0
14 years.....	0
15 to 17 years.....	0
Filler.....	

HOUSEHOLD TYPE AND RELATIONSHIP

Universe: Persons 65 years and over

In family households:

Householder.....	138
Spouse.....	82
Other relatives.....	15
Nonrelatives.....	0

In nonfamily households:

Male householder:

Living alone.....	33
Not living alone.....	4

Female householder:

Living alone.....	136
Not living alone.....	3

Nonrelatives.....	4
-------------------	---

In group quarters:

Institutionalized persons.....	11
Other persons in group quarters.....	0

Filler.....

AGE OF HOUSEHOLD MEMBERS (2) BY HOUSEHOLD SIZE AND HOUSEHOLD TYPE

Universe: Households

Households with 1 or more persons 60 years and over

1 person.....	189
---------------	-----

2 or more persons:

Family households.....	192
------------------------	-----

Nonfamily households.....	7
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Households with no persons 60 years and over

1 person.....	79
---------------	----

2 or more persons:

Family households.....	384
------------------------	-----

Nonfamily households.....	4
---------------------------	---

AGE OF HOUSEHOLD MEMBERS (3) BY HOUSEHOLD SIZE AND HOUSEHOLD TYPE

Universe: Households

Households with 1 or more persons 65 years and over

1 person.....	169
---------------	-----

2 or more persons:

Family households.....	154
------------------------	-----

Nonfamily households.....	7
---------------------------	---

Households with no persons 65 years and over

1 person.....	99
---------------	----

2 or more persons:

Family households.....	422
------------------------	-----

Nonfamily households.....	4
---------------------------	---

HOUSEHOLD TYPE

Universe: Households

Households with 1 or more nonrelatives.....	34
---	----

Households with no nonrelatives.....	821
--------------------------------------	-----

HOUSEHOLD TYPE AND HOUSEHOLD SIZE

Universe: Households

Family households:

2 persons.....	238
----------------	-----

3 persons.....	131
----------------	-----

4 persons.....	89
----------------	----

5 persons.....	62
----------------	----

6 persons.....	22
----------------	----

7 or more persons.....	34
------------------------	----

Nonfamily households:

1 person.....	268
---------------	-----

2 persons.....	9
----------------	---

3 persons.....	1
----------------	---

4 persons.....	0
----------------	---

5 persons.....	0
----------------	---

6 persons.....	1
7 or more persons.....	0
GROUP QUARTERS	
<i>Universe: Persons in group quarters</i>	
<i>Institutionalized persons (00I-99I):</i>	
Correctional institutions (20I-24I, 27I, 28I, 95I).....	9
Nursing homes (60I-67I).....	0
Mental (Psychiatric) hospitals (45I-48I).....	0
Juvenile institutions (01I-05I, 10I-12I, 15I).....	0
Other institutions (00I, 06I-09I, 13I, 14I, 16I-19I, 25I, 26I, 29.....	11
<i>Other persons in group quarters (00N-99N):</i>	
College dormitories (87N).....	0
Military quarters (96N-98N).....	0
Emergency shelters for homeless (82N, 83N).....	0
Visible in street locations (84N, 85N).....	0
Other noninstitutional group quarters (00N-81N, 86N, 88N-95N, 99N).....	0
PERSONS SUBSTITUTED	
<i>Universe: Persons</i>	
Not substituted.....	2251
<i>Substituted for:</i>	
Noninterview.....	5
Count adjustment.....	
IMPUTATION OF POPULATION ITEMS	
<i>Universe: Persons not substituted</i>	
No items allocated.....	1693
One or more items allocated.....	558
IMPUTATION OF RELATIONSHIP	
<i>Universe: Persons not substituted</i>	
Allocated.....	87
Not allocated.....	2164
IMPUTATION OF SEX	
<i>Universe: Persons not substituted</i>	
Allocated.....	61
Not allocated.....	2190
IMPUTATION OF AGE	
<i>Universe: Persons not substituted</i>	
Allocated.....	45
Not allocated.....	2206
IMPUTATION OF RACE	
<i>Universe: Persons not substituted</i>	
Allocated.....	56
Not allocated.....	2195
IMPUTATION OF HISPANIC ORIGIN	
<i>Universe: Persons not substituted</i>	
Allocated.....	455
Not allocated.....	1796
IMPUTATION OF MARITAL STATUS	
<i>Universe: Persons 15 years and over</i>	
Substituted.....	4
<i>Not substituted:</i>	
Allocated.....	42
Not allocated.....	1624
HOUSING UNITS	
<i>Universe: Housing units</i>	
Total.....	932
OCCUPANCY STATUS	
<i>Universe: Housing units</i>	
Occupied.....	855
Vacant.....	77
TENURE	
<i>Universe: Occupied housing units</i>	

Owner occupied.....	565
Renter occupied.....	290

URBAN AND RURAL

Universe: Housing units

Urban:

Inside urbanized area.....	0
Outside urbanized area.....	0
Rural.....	0
Not defined for this file.....	932

VACANCY STATUS

Universe: Vacant housing units

For rent.....	27
For sale only.....	11
Rented or sold, not occupied.....	6
For seasonal, recreational, or occasional use.....	0
For migrant workers.....	0
Other vacant.....	33

BOARDED-UP STATUS

Universe: Vacant housing units

Boarded up.....	5
Not boarded up.....	72

USUAL HOME ELSEWHERE

Universe: Vacant housing units

Vacant, usual home elsewhere.....	2
All other vacants.....	75

RACE OF HOUSEHOLDER

Universe: Occupied housing units

White.....	443
Black.....	410
American Indian, Eskimo, or Aleut.....	1
Asian or Pacific Islander.....	1
Other race.....	0

TENURE BY RACE OF HOUSEHOLDER

Universe: Occupied housing units

Owner occupied

White.....	344
Black.....	220
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	1
Other race.....	0

Renter occupied

White.....	99
Black.....	190
American Indian, Eskimo, or Aleut.....	1
Asian or Pacific Islander.....	0
Other race.....	0

HISPANIC ORIGIN OF HOUSEHOLDER BY RACE OF HOUSEHOLDER

Universe: Occupied housing units

Not of Hispanic origin

White.....	443
Black.....	410
American Indian, Eskimo, or Aleut.....	1
Asian or Pacific Islander.....	0
Other race.....	0

Hispanic origin

White.....	0
Black.....	0
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	1
Other race.....	0

TENURE BY RACE OF HOUSEHOLDER

Universe: Occupied housing units with householder of Hispanic origin

Owner occupied

White.....	0
Black.....	0
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	1
Other race.....	0

Renter occupied

White.....	0
Black.....	0
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	0
Other race.....	0

TENURE BY AGE OF HOUSEHOLDER

Universe: Occupied housing units

Owner occupied

15 to 24 years.....	9
25 to 34 years.....	68
35 to 44 years.....	82
45 to 54 years.....	64
55 to 64 years.....	98
65 to 74 years.....	111
75 years and over.....	133

Renter occupied

15 to 24 years.....	33
25 to 34 years.....	83
35 to 44 years.....	47
45 to 54 years.....	32
55 to 64 years.....	25
65 to 74 years.....	38
75 years and over.....	32

ROOMS

Universe: Housing units

1 room.....	5
2 rooms.....	38
3 rooms.....	98
4 rooms.....	171
5 rooms.....	226
6 rooms.....	181
7 rooms.....	107
8 rooms.....	56
9 or more rooms.....	50

AGGREGATE ROOMS

Universe: Housing units

Total.....	4972
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AGGREGATE ROOMS BY TENURE

Universe: Occupied housing units

Total	
Owner occupied.....	3331
Renter occupied.....	1257

AGGREGATE ROOMS BY VACANCY STATUS

Universe: Vacant housing units

Total	
For rent.....	125
For sale only.....	62
Rented or sold, not occupied.....	36
For seasonal, recreational, or occasional use.....	0
For migrant workers.....	0
Other vacant.....	161

PERSONS IN UNIT

Universe: Occupied housing units

1 person.....	268
2 persons.....	247
3 persons.....	132
4 persons.....	89
5 persons.....	62
6 persons.....	23
7 or more persons.....	34

PERSONS PER OCCUPIED HOUSING UNIT

Universe: Occupied housing units

Persons per occupied housing unit.....	2.62
--	------

TENURE BY PERSONS IN UNIT

Universe: Occupied housing units

Owner occupied

1 person.....	166
2 persons.....	176
3 persons.....	87
4 persons.....	63
5 persons.....	37
6 persons.....	14
7 or more persons.....	22

Renter occupied

1 person.....	102
2 persons.....	71
3 persons.....	45
4 persons.....	26
5 persons.....	25
6 persons.....	9
7 or more persons.....	12

PERSONS PER OCCUPIED HOUSING UNIT BY TENURE

Universe: Occupied housing units

Persons per occupied housing unit

Owner occupied.....	2.62
Renter occupied.....	2.60

AGGREGATE PERSONS

Universe: Persons in occupied housing units

Total.....	2236
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AGGREGATE PERSONS BY TENURE

Universe: Persons in occupied housing units

Total

Owner occupied.....	1481
Renter occupied.....	755

PERSONS PER ROOM

Universe: Occupied housing units

0.50 or less.....	562
0.51 to 1.00.....	208
1.01 to 1.50.....	51
1.51 to 2.00.....	24
2.01 or more.....	10

TENURE BY PERSONS PER ROOM

Universe: Occupied housing units

Owner occupied

0.50 or less.....	399
0.51 to 1.00.....	120
1.01 to 1.50.....	26
1.51 to 2.00.....	13
2.01 or more.....	7

Renter occupied

0.50 or less.....	163
0.51 to 1.00.....	88
1.01 to 1.50.....	25
1.51 to 2.00.....	11

2.01 or more.....3

VALUE

Universe: Specified owner-occupied housing units

Less than \$15,000.....	54
\$15,000 to \$19,999.....	17
\$20,000 to \$24,999.....	34
\$25,000 to \$29,999.....	59
\$30,000 to \$34,999.....	48
\$35,000 to \$39,999.....	50
\$40,000 to \$44,999.....	26
\$45,000 to \$49,999.....	25
\$50,000 to \$59,999.....	49
\$60,000 to \$74,999.....	37
\$75,000 to \$99,999.....	23
\$100,000 to \$124,999.....	4
\$125,000 to \$149,999.....	3
\$150,000 to \$174,999.....	6
\$175,000 to \$199,999.....	0
\$200,000 to \$249,999.....	0
\$250,000 to \$299,999.....	0
\$300,000 to \$399,999.....	0
\$400,000 to \$499,999.....	0
\$500,000 or more.....	1

LOWER VALUE QUARTILE

Universe: Specified owner-occupied housing units

Lower value quartile.....25300

MEDIAN VALUE

Universe: Specified owner-occupied housing units

Median value.....35600

UPPER VALUE QUARTILE

Universe: Specified owner-occupied housing units

Upper value quartile.....52900

AGGREGATE VALUE

Universe: Specified owner-occupied housing units

Total.....18512000

RACE OF HOUSEHOLDER

Universe: Specified owner-occupied housing units

White.....	300
Black.....	136
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	0
Other race.....	0

AGGREGATE VALUE BY RACE OF HOUSEHOLDER

Universe: Specified owner-occupied housing units

Total	
White.....	14240500
Black.....	4271500
American Indian, Eskimo, or Aleut.....	0
Asian or Pacific Islander.....	0
Other race.....	0

HISPANIC ORIGIN OF HOUSEHOLDER

Universe: Specified owner-occupied housing units

Not of Hispanic origin.....	436
Hispanic origin.....	0

AGGREGATE VALUE BY HISPANIC ORIGIN OF HOUSEHOLDER

Universe: Specified owner-occupied housing units

Total	
Not of Hispanic origin.....	18512000
Hispanic origin.....	0

AGGREGATE VALUE BY UNITS IN STRUCTURE

Universe: Owner-occupied housing units

Total	
1, detached.....	20448500
1, attached.....	190000
2.....	102500
3 or more.....	122500
Mobile home or trailer.....	1180500
Other.....	540000

VACANCY STATUS

Universe: Vacant housing units

Specified vacant for rent.....	27
Specified vacant for sale only.....	9
All other vacants.....	41

AGGREGATE PRICE ASKED

Universe: Specified vacant-for-sale-only housing units

Total.....	404000
------------	--------

CONTRACT RENT

Universe: Specified renter-occupied housing units

With cash rent:

Less than \$100.....	108
\$100 to \$149.....	53
\$150 to \$199.....	29
\$200 to \$249.....	26
\$250 to \$299.....	10
\$300 to \$349.....	4
\$350 to \$399.....	4
\$400 to \$449.....	1
\$450 to \$499.....	1
\$500 to \$549.....	0
\$550 to \$599.....	0
\$600 to \$649.....	0
\$650 to \$699.....	1
\$700 to \$749.....	0
\$750 to \$999.....	0
\$1,000 or more.....	0

No cash rent.....	47
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LOWER CONTRACT RENT QUARTILE

Universe: Specified renter-occupied housing units paying cash rent

Lower contract rent quartile.....	99
-----------------------------------	----

MEDIAN CONTRACT RENT

Universe: Specified renter-occupied housing units paying cash rent

Median contract rent.....	110
---------------------------	-----

UPPER CONTRACT RENT QUARTILE

Universe: Specified renter-occupied housing units paying cash rent

Upper contract rent quartile.....	179
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AGGREGATE CONTRACT RENT

Universe: Specified renter-occupied housing units paying cash rent

Total.....	30875
------------	-------

RACE OF HOUSEHOLDER

Universe: Specified renter-occupied housing units paying cash rent

White.....	83
Black.....	153
American Indian, Eskimo, or Aleut.....	1
Asian or Pacific Islander.....	0
Other race.....	0

AGGREGATE CONTRACT RENT BY RACE OF HOUSEHOLDER

Universe: Specified renter-occupied housing units paying cash rent

Total	
White.....	13665
Black.....	17073
American Indian, Eskimo, or Aleut.....	137
Asian or Pacific Islander.....	0

Other race.....	0
HISPANIC ORIGIN OF HOUSEHOLDER	
Universe: Specified renter-occupied housing units paying cash rent	
Not of Hispanic origin.....	237
Hispanic origin.....	0
AGGREGATE CONTRACT RENT BY HISPANIC ORIGIN OF HOUSEHOLDER	
Universe: Specified renter-occupied housing units paying cash rent	
Total	
Not of Hispanic origin.....	30875
Hispanic origin.....	0
AGGREGATE RENT ASKED	
Universe: Specified vacant-for-rent housing units	
Total.....	3983
AGE OF HOUSEHOLDER(4) BY MEALS INCLUDED IN RENT	
Universe: Specified renter-occupied housing units	
Under 65 years	
With cash rent:	
Meals included in rent.....	1
No meals included in rent.....	176
No cash rent.....	39
65 years and over	
With cash rent:	
Meals included in rent.....	2
No meals included in rent.....	58
No cash rent.....	8
VACANCY STATUS(3) BY DURATION OF VACANCY	
Universe: Vacant housing units	
For rent	
Less than 2 months.....	14
2 up to 6 months.....	8
6 or more months.....	5
For sale only	
Less than 2 months.....	1
2 up to 6 months.....	1
6 or more months.....	9
All other vacants	
Less than 2 months.....	3
2 up to 6 months.....	3
6 or more months.....	33
UNITS IN STRUCTURE	
Universe: Housing units	
1, detached.....	643
1, attached.....	6
2.....	21
3 or 4.....	32
5 to 9.....	44
10 to 19.....	29
20 to 49.....	31
50 or more.....	0
Mobile home or trailer.....	109
Other.....	17
UNITS IN STRUCTURE	
Universe: Vacant housing units	
1, detached.....	53
1, attached.....	0
2.....	2
3 or 4.....	4
5 to 9.....	1
10 to 19.....	6
20 to 49.....	0
50 or more.....	0

Mobile home or trailer.....	10
Other.....	1

TENURE BY UNITS IN STRUCTURE

Universe: Occupied housing units

Owner occupied

1, detached.....	466
1, attached.....	4
2.....	3
3 or 4.....	2
5 or 9.....	1
10 to 19.....	0
20 to 49.....	0
50 or more.....	0
Mobile home or trailer.....	76
Other.....	13

Renter occupied

1, detached.....	124
1, attached.....	2
2.....	16
3 or 4.....	26
5 or 9.....	42
10 to 19.....	23
20 to 49.....	31
50 or more.....	0
Mobile home or trailer.....	23
Other.....	3

AGGREGATE PERSONS BY TENURE BY UNITS IN STRUCTURE

Universe: Persons in occupied housing units

Total

Owner occupied

1, detached.....	1151
1, attached.....	15
2.....	5
3 or 4.....	2
5 to 9.....	4
10 to 19.....	0
20 to 49.....	0
50 or more.....	0
Mobile home or trailer.....	259
Other.....	45

Renter occupied

1, detached.....	324
1, attached.....	8
2.....	27
3 or 4.....	69
5 to 9.....	99
10 to 19.....	63
20 to 49.....	89
50 or more.....	0
Mobile home or trailer.....	62
Other.....	14

HOUSING UNITS SUBSTITUTED

Universe: Housing units

Substituted.....	16
Not substituted.....	916

IMPUTATION OF HOUSING ITEMS

Universe: Housing units not substituted

No items allocated.....	721
One or more items allocated.....	195

IMPUTATION OF VACANCY STATUS

Universe: Vacant housing units

Substituted.....	1
Not substituted:	
Allocated.....	5
Not allocated.....	71
IMPUTATION OF DURATION OF VACANCY	
<i>Universe: Vacant housing units</i>	
Substituted.....	1
Not substituted:	
Allocated.....	8
Not allocated.....	68
IMPUTATION OF UNITS IN STRUCTURE	
<i>Universe: Housing units not substituted</i>	
Allocated.....	80
Not allocated.....	836
IMPUTATION OF ROOMS	
<i>Universe: Housing units not substituted</i>	
Allocated.....	15
Not allocated.....	901
IMPUTATION OF TENURE	
<i>Universe: Occupied housing units</i>	
Substituted.....	15
Not substituted:	
Allocated.....	28
Not allocated.....	812
IMPUTATION OF VALUE	
<i>Universe: Specified owner-occupied housing units</i>	
Substituted.....	6
Not substituted:	
Allocated.....	23
Not allocated.....	407
IMPUTATION OF PRICE ASKED	
<i>Universe: Specified vacant-for-sale-only housing units</i>	
Substituted.....	0
Not substituted:	
Allocated.....	1
Not allocated.....	8
IMPUTATION OF CONTRACT RENT	
<i>Universe: Specified renter-occupied housing units</i>	
With cash rent:	
Substituted.....	6
Not substituted:	
Allocated.....	7
Not allocated.....	224
No cash rent.....	47
IMPUTATION OF MEALS INCLUDED IN RENT	
<i>Universe: Specified renter-occupied housing units</i>	
With cash rent:	
Substituted.....	6
Not substituted:	
Allocated.....	16
Not allocated.....	215
No cash rent.....	47

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STATE OF MISSISSIPPI

DEPARTMENT OF ENVIRONMENTAL QUALITY

JAMES I. PALMER, JR.
EXECUTIVE DIRECTOR

COMPLIANCE

May 9, 1997

Mr. Brian Farrier
Site Investigation and
Support Branch
Waste Management Division
U.S. EPA - Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

Re: Preliminary Assessment (PA) Report
Delta Brick
MSD 985975473
Macon, Noxubee County, Mississippi

Dear Brian:

Enclosed is the Preliminary Assessment Report for Delta Brick. If you have any questions, please contact John Andrews, phone (601)961-5301.

Sincerely,

A handwritten signature in cursive script that reads "Phillip Weathersby".

Phillip Weathersby
Cercla Section

JA:pl

Enclosure

Sites," OSWER Directive 9345.1-08). If during any stage of the PA investigation you come across information that leads you to believe the site might be eligible for RCRA Subtitle C corrective action, notify your Regional EPA site assessment contact, who will discuss the situation with representatives of the RCRA program and decide whether to proceed with CERCLA investigative activities.

Table 2-1
RCRA Eligibility Checklist

1. Has the facility treated, stored, or disposed any RCRA hazardous waste for any period of time since November 19, 1980? (If the facility or site is a known "protective filer," check no.)

☐ Yes ☐ No

IF THE ANSWER TO QUESTION 1 IS "NO", STOP; SITE IS NOT ELIGIBLE FOR RCRA RESPONSE.

IF YES, CONTINUE WITH CHECKLIST.

2. Does the facility currently have a RCRA Part B Operating Permit or a post-closure permit?

☐ Yes ☐ No

3. Did the facility file a Part A Permit Application?

☐ Yes ☐ No

If yes,

- Does the facility currently have interim RCRA status?

☐ Yes ☐ No

- Did the facility convert its status from TSF to "Generator" or "Non-handler"?

☐ Yes ☐ No

If no,

- Is the facility a "Non- or Late Filer"?

☐ Yes ☐ No

IF ANSWERS TO ALL QUESTIONS IN PARTS 2 AND 3 ARE "NO," THE SITE IS NOT ELIGIBLE FOR RCRA RESPONSE. IF THE ANSWER TO ANY QUESTION IS "YES," DISCUSS THE SITE WITH YOUR EPA SITE ASSESSMENT CONTACT.

2.2.2 CERCLA Petroleum Exclusion

CERCLA authorized Federal response to releases or threatened releases of "hazardous substances" and "pollutants and contaminants." CERCLA excludes "petroleum, including crude oil or any fraction thereof" from the definition of these terms. However, CERCLA does not define the specific types of petroleum products excluded.

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STEPHEN G. HIBBINS
Timminco Metals

NTAGONISTS. See CARDIOVASCULAR AGENTS.

CALCIUM COMPOUNDS

Survey, 787
Calcium carbonate, 796
Calcium chloride, 801
Calcium sulfate, 812

8401424

SURVEY

The chemical element calcium [7440-70-2], Ca, atomic number 20, is an alkaline-earth metal which is fifth in abundance among all elements (ca 4%) and the third most abundant metal found in the earth's crust (1). It is too reactive to be found naturally in the free state, but its compounds are widespread as the minerals listed in Table 1 indicate. Calcite [13397-26-7], CaCO_3 , found as limestone, marble, and chalk, makes up approximately 7% of the earth's crust. Gypsum [13397-24-5], $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, fluorspar or fluorite [7789-75-5], CaF_2 , and dolomite [16389-88-1], $\text{CaCO}_3 \cdot \text{MgCO}_3$, are other minerals that occur in sufficient quantities to serve as sources for elemental calcium. Lime feldspar [1302-54-1] (anorthite), $\text{CaAl}_2\text{Si}_2\text{O}_8$, accounts for more than half of the feldspars, which in turn make up some 60% of igneous rocks, eg, basalt and granite (2).

Table 1. Calcium-Containing Minerals

Mineral	CAS Registry Number	Molecular formula
marble		CaCO_3
limestone		CaCO_3
calcite	[13397-26-7]	CaCO_3
dolomite	[17069-72-6]	$\text{CaCO}_3 \cdot \text{MgCO}_3$
gypsum	[13397-24-5]	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
anhydrite	[14798-04-0]	CaSO_4
fluorspar	[7789-75-5]	CaF_2
fluorapatite	[1306-05-4]	$\text{Ca}_5\text{F}(\text{PO}_4)_3$
hydroxylapatite	[1306-06-5]	$\text{Ca}_5\text{OH}(\text{PO}_4)_3$
selenite	[15698-85-8]	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
anorthite	[1302-54-1]	$\text{CaAl}_2\text{Si}_2\text{O}_8$

The oceans contain vast quantities of ionic calcium, Ca^{2+} , to the extent of 400 mg/L of seawater (3). Calcium is present in living organisms as a constituent of bones, teeth, shell, and coral. It is essential to plant as well as animal life.

Limestone and marble have been mined as building materials and the oxide of calcium, lime [1305-78-8], has been used in the manufacture of ~~concrete~~ for centuries (see BUILDING MATERIALS, SURVEY; LIME AND LIMESTONE). ~~Concrete is a mixture of~~

...such as porcelain enamel (see ENAMELS, VITREOUS OR PORCELAIN). Increasingly ceramics are being produced from synthetic materials of high purity because of the unique properties that may be obtained (see ADVANCED CERAMICS). The clays used in conventional ceramics are far from being pure compounds.

In general, ceramic ware is produced by plasticizing the clay by the addition of water so that it may be shaped or formed into the desired object. Ceramic products may also be formed by dispersing the clay in water to form a slip which is then cast in a plaster mold. After being shaped, the object is dried to increase its strength so that it may be handled, and is then fired at elevated temperatures until there has been some vitrification or fusion of the components to form a glassy bond that makes the shape permanent and strong so that the object does not disintegrate in water. In the case of porcelain enamel the slip is sprayed on a metal surface and then fired.

Properties. Plasticity. Plasticity may be defined as the property of a material that permits it to be deformed under stress without rupturing and to retain the shape produced after the stress is removed. When water is added to dry clay in successive increments, the clay becomes workable, that is, readily shaped without rupturing. The workability and retention of shape develop within a very narrow moisture range.

Plasticity may be measured by determination of: (1) the water of plasticity defined as the amount of water necessary to develop maximum plasticity, a subjective judgment, or the range of water content in which plasticity is demonstrated; (2) the amount of penetration of an object, frequently a needle or some type of plunger, into a plastic mass of clay under a given load or rate of loading and at varying moisture contents; and (3) the stress necessary to deform the clay and the maximum deformation the clay undergoes before rupture at different moisture contents and with varying rates of stress application.

In ceramics, plasticity is usually evaluated by means of the water of plasticity. Values for the common clay minerals are given in Table 1. Each clay mineral can be expected to show a range of values because particle size, exchangeable ion composition, and crystallinity of the clay mineral also exert an influence. Nonclay mineral components, soluble salts, organic compounds, and texture can also affect the water of plasticity.

In general, a relatively low value for water of plasticity is desired in ceramics and hence kaolinite, illite, and chlorite [14998-27-7] clays have better plasticity characteristics than attapulgite or montmorillonite. The plasticity values of the first group are changed only slightly by variations in the exchangeable cation composition. However, sodium gives lower values than calcium, magnesium, potassium, and hydrogen. In the case of montmorillonite, the water of plasticity varies considerably with the nature of the exchangeable cations, sodium giving higher values than the others.

Clays composed only of clay minerals may have higher water of plasticity values than desired. Consequently, the presence of substantial amounts of non-clay minerals or the addition of materials that reduce the water of plasticity may improve the working characteristics of a clay.

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General References

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T. DOMBROWSKI
 Engelhard Corporation

USES

Clays are composed of extremely fine particles of clay minerals which are layer-type aluminum silicates containing structural hydroxyl groups. In some clays, iron or magnesium substitutes for aluminum in the lattice, and alkalies and alkaline earths may be essential constituents in others. Clays may also contain varying amounts of nonclay minerals such as quartz [14808-60-7], calcite [13397-26-7], feldspar [68476-25-5], and pyrite [1309-36-0]. Clay particles generally give well-defined x-ray diffraction patterns from which the mineral composition can readily be determined.

Clay particles are so finely divided that clay properties are often controlled by the surface properties of the minerals rather than by bulk chemical composition. Particle size, size distribution, and shape; the nature and amount of both mineral and organic impurities; soluble materials, nature, and amount of exchangeable ions; and degree of crystal perfection are all known to affect the properties of clays profoundly.

Which is brick

Clays are classified into six groups by the U.S. Bureau of Mines (1): kaolin, ball clay, fire clay, bentonite, fuller's earth, and common clay and shale. About half the volume of clays produced in the United States is in the last category. In terms of monetary value, however, kaolin accounts for about two-thirds of the dollar volume.

Ceramic Products

A large proportion of the annual production of ball clay, fire clay, and common clay and shale are used for ceramics (qv). Ceramic products are generally considered to be products made from fine-grained oxides, silicates, and many other naturally occurring materials through the application of high temperature. The

The presence of nonclay minerals tends to reduce drying shrinkage depending on mineral shape, particle size distribution, and abundance. Granular particles having a wide distribution of sizes are most effective. The presence of nonclay minerals at about 25% of the ceramic body composition is generally desirable for minimizing shrinkage. Drying shrinkage is also related to texture. For example, if the clay mass shows parallel orientation of the basal plane surfaces of the clay minerals, shrinkage in the direction at right angles to the basal planes is substantially greater than in the direction parallel to them (4).

In the initial drying phase of a clay body the volume shrinkage is about equal to the volume of water evaporated. Beyond a given moisture content there is either no further shrinkage or only a very small amount of water is lost. The water lost during the shrinkage interval is called shrinkage water and is that which separates the component particles. The critical point at which shrinkage stops is reached when the moisture film around the particle becomes so thin that the particles touch one another and shrinkage can go no further. The water loss following the shrinkage period is called pore water.

In the production of ceramic ware the shape of the ware must be retained after drying and the ware must be free from cracks and other defects. Controlled drying helps to minimize defects. In general, clays containing moderate amounts of nonclay minerals are easier to dry than those composed wholly of clay minerals. Furthermore, clays composed of illite, chlorite, and kaolinite are relatively easier to dry than those composed of montmorillonite.

Dry Strength. Dry strength is measured as the transverse breaking strength of a test piece after drying long enough, usually at 105°C, to remove almost all the pore and adsorbed water. Values, given in Table 1, usually show a large range because of variations in particle size distribution, crystallinity, and, especially for montmorillonite, the nature of the exchangeable ions.

Large amounts of nonclay mineral components, especially if the particles are well sorted, tend to reduce the dry strength. In general, the dry strength is higher when sodium is the adsorbed cation. The presence of organic matter in some clays increases dry strength and this appears partly to be the explanation for the high dry strength for some ball clays. A principal factor in determining dry strength is the particle size of the clay mineral component. The maximum strength increases rapidly as the particle size decreases.

Firing Properties. Heating clay materials to a sufficiently high temperature results in fusion of the material. In the 100–150°C range, the shrinkage and pore water are lost with the attendant dimensional changes. In general, the rate of oxidation increases with increasing temperature. The oxidation of sulfides, present in many clays, frequently in the form of pyrite, FeS_2 , begins between 400 and 500°C. Beginning at about 500°C and in some cases continuing to 900°C, the hydroxyl groups of the clay minerals condense and are driven off as water vapor. The exact temperature, rate, and abruptness of the loss of hydroxyls depend on the nature of the clay minerals and the particle sizes. Reduction of particle size, particularly if accompanied by poor crystallinity, tends to reduce the temperature interval. Kaolinite and halloysite minerals lose hydroxyls abruptly at 450–600°C. The loss of hydroxyls from montmorillonite minerals varies greatly with structure

minerals tends to reduce drying shrinkage depending on particle size distribution, and abundance. Granular particles of sizes are most effective. The presence of nonclay material in the body composition is generally desirable for strength. Shrinkage is also related to texture. For example, the orientation of the basal plane surfaces of the clay particles at right angles to the basal planes is shrinkage reduction parallel to them (4).

In a clay body the volume shrinkage is about equal to the linear shrinkage. Beyond a given moisture content there is either no shrinkage or very small amount of water is lost. The water lost is called shrinkage water and is that which separates from the clay particles. The critical point at which shrinkage stops is when the film around the particle becomes so thin that the water cannot be removed. The shrinkage can go no further. The water loss follows the removal of pore water.

In ware the shape of the ware must be retained and it must be free from cracks and other defects. Controlled shrinkage is essential. In general, clays containing moderate amounts of iron, magnesia, and soda are drier than those composed wholly of clay minerals. Illite, chlorite, and kaolinite are relatively easier to handle than montmorillonite.

Shrinkage is measured as the transverse breaking strength. The ware must be strong enough, usually at 105°C, to remove water. Values, given in Table 1, usually show a wide variation in particle size distribution, crystallinity, and the nature of the exchangeable ions.

Mineral components, especially if the particles are very fine, affect strength. In general, the dry strength is higher in clays containing iron. The presence of organic matter in some clays appears partly to be the explanation for the high dry strength. A principal factor in determining dry strength is the clay mineral component. The maximum strength increases with increasing iron content.

Clay materials to a sufficiently high temperature. In the 100–150°C range, the shrinkage and pore water are removed. In general, the rate of shrinkage increases with increasing temperature. The oxidation of sulfides, especially in the form of pyrite, FeS_2 , begins between 400 and 500°C and in some cases continuing to 900°C, the sulfur dioxide condenses and is driven off as water vapor. The abruptness of the loss of hydroxyls depends on the clay mineral and the particle sizes. Reduction of particle size, increase in crystallinity, tends to reduce the temperature at which minerals lose hydroxyls abruptly at 450–600°C. Montmorillonite minerals varies greatly with structure.

The loss of hydroxyls is usually accompanied by a modification, not a complete destruction of the structure. In the montmorillonite-type clay minerals, hydroxyl loss is not accompanied by shrinkage, whereas in kaolinite and halloysite the loss is accompanied by shrinkage, which continues up into the vitrification range. In the range of 800 to 900°C, the structure of the clay mineral is destroyed and significant firing shrinkage develops. Values for firing shrinkage are also given in Table 1. The range of shrinkage values results from variations in size and shape of the clay mineral particles, the degree of crystallinity, and in the case of the montmorillonite-type of minerals, variations in composition.

At temperatures above about 900°C new crystalline phases develop from all the clay minerals except those containing large amounts of iron, alkalies, or alkaline earths. In these latter cases fusion may result after the loss of structure without any intervening crystalline phase. Frequently there is a series of new high temperature phases developing in an overlapping sequence as the mineral is heated to successively higher temperatures. This is followed by complete fusion of the mineral, which, in the case of kaolinite, takes place at 1650–1775°C. For the montmorillonite-type minerals, the fusion temperature varies from about 1000 to 1550°C, the lower values being found in minerals relatively rich in iron, alkalies, and alkaline earths.

The initial high temperature phases are frequently related to the structure of the original clay mineral, whereas the later phases developing at higher temperatures are related to the overall composition. In the development of high temperature phases, nucleation of the new lattice configuration takes place first, followed by a gradual growth of the new structure and an increase in its perfection as the temperature is raised. Traces of various elements cause substantial changes in the temperature and the rate of formation of the high temperature phases.

Miscellaneous. Other important properties are resistance to thermal shock, attack by slag, and, in the case of refractories (qv), thermal expansion. For white-ware, translucency, acceptance of glazes, etc., may be extremely important. These properties depend on the clay mineral composition, the method of manufacture and impurity content.

Raw Materials. Raw material requirements vary widely, depending on use.

Brick. A clay of satisfactory composition is satisfactory for the manufacture of brick unless the clay contains a large percentage of coarse material that cannot be eliminated or ground to adequate fineness. A high concentration of nonclay material in a silt-size range may cause difficulties by greatly reducing the green and firing strength of the brick. If the coarse material is present only in very small amounts, or the shrinkage may be excessive. Clays composed of mixtures of clay minerals having from 20–50% of unsorted fine-grain nonclay materials are most satisfactory. Large amounts of iron, alkalies, and alkaline earths, either in the clay minerals or as other constituents, cause too much shrinkage and greatly reduce the vitrification range; thus, a clay with a substantial amount of calcareous material is not desirable. Face bricks, which are of superior quality, are made from similar materials but it is even more desirable to avoid these detrimental components (see BUILDING MATERIALS, SURVEY).

ring at a low temperature. Drain tiles are often made from clays having about 75% of fine-grained nonclay mineral material in addition to components that provide a high green and dry strength and a low fusion point. ~~These tiles are~~ frequently made of mixtures where talc and ~~kaolin~~ are the primary components.

Terra-Cotta, Stoneware, Sewer Pipe, and Paving Brick. Clays composed of mixtures of clay minerals containing 25–50% fine-grained unsorted quartz are well suited for the manufacture of terra-cotta, stoneware, sewer pipe, and paving brick. A small amount of ~~montmorillonite~~ can be tolerated, but a large amount gives undesirable shrinkage and drying properties. In general, clays having low shrinkage, good plastic properties, and a long vitrification range should be used.

Whiteware. Porcelain and dinnerware are made up of about equal amounts of ~~kaolin~~ ball clay, flint (ground quartz), feldspar, or some other white-burning fluxing material such as talc [14807-96-6] and nepheline. The kaolin clay is composed of well-crystallized particles of kaolinite. Ball clays are white-burning, highly plastic, and easily dispersible. They provide the plasticity necessary in the forming of the ware and adequate green and dry strength for handling. The chief component of most ball clays is extremely fine-grained and poorly organized kaolinite. However, some ball clays are known, for example, those in south Devonshire in Great Britain, that contain remarkably well-ordered kaolinite. Some ball clays also contain small amounts of illite and/or small amounts of montmorillonite which may add to desired properties. Many ball clays also contain a small but significant amount of organic material that also appears to enhance the desired properties. Small amounts of bentonites and, in some cases, halloysite, are also used in whiteware bodies as replacements of ball clay to increase dry strength.

Porcelain Enamel. The ~~body~~ used in enameling is commonly composed of ball clay, frits, and ~~glazing pigment (qv)~~. The ~~frits~~ are finely ground particles of glass with a low fusion temperature.

Refractories. Refractory products are prepared from a wide variety of naturally occurring materials such as chromite [1308-31-2] and magnesite [546-93-0] or from clays predominantly composed of ~~kaolin~~. Increasingly, higher purity synthetic materials are being used to obtain special properties. On the other hand, for many refractory uses, a somewhat lower fusion point than that provided by kaolinite may be adequate, so that clay materials having a moderate amount of other components as, for example, illite, may be satisfactory. High alumina clays are also used extensively for the manufacture of special types of refractories.

An interesting type of clay used widely in the manufacture of refractories is so-called flint clay, which is very hard and has very slight plasticity even when finely ground. Flint clays are essentially pure, extremely fine-grained ~~kaolinite~~. In some cases the hardness appears to result from the presence of a small amount of free silica acting as a cement, whereas in other cases it is the result of an intergrowth of extremely small kaolinite particles.

Paper

The paper (qv) industry is the largest consumer of processed clays, nearly all of which is ~~kaolin~~ (5,6). Kaolin has two main uses in paper: as a filler where kaolin

Curtis Nicholson
494 Dogwood Blvd.
Columbus Ms. 39201

Fold at line over top of envelope to
right of the return address

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2 387 293 023

MAIL



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30365

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United States

Environmental Protection Agency
Region IV

345 Courtland Street

Atlanta Georgia 30365
Att Brian Farnier

SAMPLE PUBLIC PETITION FORMAT

(Regional Administrator)
United States Environmental Protection Agency
Region (Insert proper Region number)

-or-

(Administrator)
(Federal Agency)
(local address)

[Instructions in brackets can be replaced with relevant information, and the brackets deleted.]

Under the authority of CERCLA Section 105 (d), as amended, the petitioner,

(Name) : Curtis Nicholson

(Address) : 494 Dogwood Blvd

(Telephone Number) : 601-329-4166

hereby requests that Region [(insert number of U.S. EPA Region in which release/threatened release is located from list provided in the bulletin) of the United States Environmental Protection Agency (or) (name of appropriate Federal agency, in the case of a suspected release/potential release from a Federal facility)] conduct a preliminary assessment of the suspected [release (or) threatened release] of a hazardous substance, pollutant, or contaminant at the following location:

(Precise description of the location of the release/threatened release: attach marked map if possible)

Petitioner is affected by the [release (or) threatened release] because:

(Describe as completely as possible how you are affected, or potentially affected,
by the release/threatened release)

[The information requested below is not required but, to the extent that it can be included, it will expedite review of and response to your petition.]

Type or characteristics of the substance(s) involved:

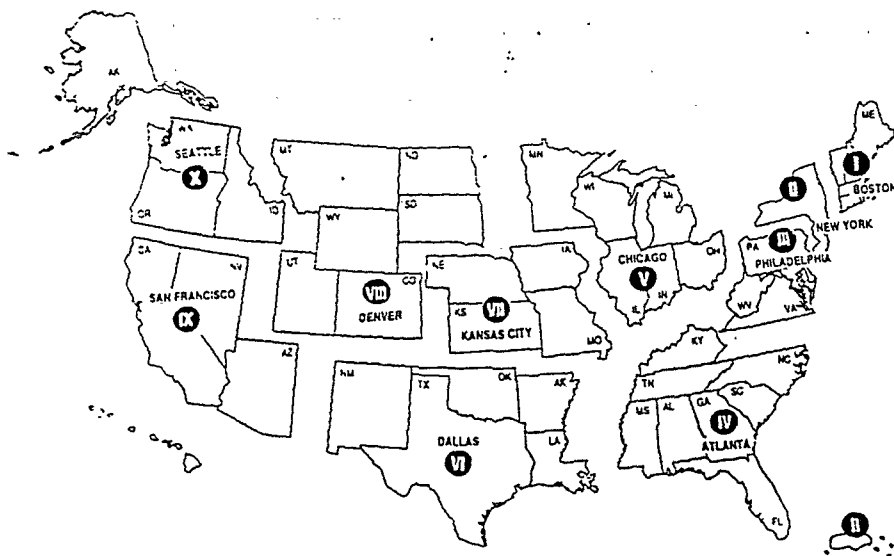
ALL TYPES OF CHEMICAL
THAT WILL KILL YOU.

Nature and history of any activities that have occurred regarding the release/threatened release:

CHEMICAL
MOTHER & FATHER DEAD OF CHEMICAL

State and local authorities you have contacted about the release/threatened release and the response, if any:

HEALTH DEPT. OF MACON MICH.
DOK. OF STATE CITY OF MACON MICH.



Region I

Regional Administrator
U.S. Environmental Protection Agency
John F. Kennedy Federal Building
Room 2203
Boston, MA 02203

*Connecticut, Maine, Massachusetts,
New Hampshire, Rhode Island, Vermont*

Region II

Regional Administrator
U.S. Environmental Protection Agency
26 Federal Plaza
New York, NY 10278

*New Jersey, New York, Puerto Rico,
Virgin Islands*

Region III

Regional Administrator
U.S. Environmental Protection Agency
841 Chestnut Street
Philadelphia, PA 19107

*Delaware, District of Columbia, Mary-
land, Pennsylvania, Virginia, West
Virginia*

Region IV

Regional Administrator
U.S. Environmental Protection Agency
345 Courtland St., NE
Atlanta, GA 30365

*Alabama, Florida, Georgia, Kentucky,
Mississippi, North Carolina, South
Carolina, Tennessee*

Region V

Regional Administrator
U.S. Environmental Protection Agency
230 S. Dearborn St.
13th Floor - (HR-11)
Chicago, IL 60604

*Illinois, Indiana, Michigan, Minnesota,
Ohio, Wisconsin*

Region VI

Regional Administrator
U.S. Environmental Protection Agency
1445 Ross Avenue
12th Floor, Suite 1200
Dallas, TX 75202-2733

*Arkansas, Louisiana, New Mexico,
Oklahoma, Texas*

Region VII

Regional Administrator
U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, KS 66101

Iowa, Kansas, Missouri, Nebraska

Region VIII

Regional Administrator
U.S. Environmental Protection Agency
One Denver Place-Suite 500
999 18th Street
Denver, CO 80202-2413

*Colorado, Montana, North Dakota,
South Dakota, Utah, Wyoming*

Region IX

Regional Administrator
U.S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

*American Samoa, Arizona, California,
Commonwealth of Guam, Hawaii,
Nevada, Marianas, Trust Territories*

Region X

Regional Administrator
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Alaska, Idaho, Oregon, Washington

**A list of addresses for other
Federal agencies can be obtained
by calling the EPA Regional
Federal Facility Coordinators at
the following numbers.**

Region I	(617) 565-3287
Region II	(212) 264-6723
Region III	(215) 597-1168
Region IV	(404) 347-3776
Region V	(312) 886-7500
Region VI	(214) 655-2260
Region VII	(913) 236-2823
Region VIII	(303) 293-1644
Region IX	(415) 974-7539
Region X	(206) 442-1327

* Delta Brick Div of Boral Bricks Inc.

MSD985978473

HWY 4

Mason County 39341

Lat: 33° 5' 25" , Long: 88° 46' 37.9"

PCS (Permit Compliance Syst.

* Delta Brick Shugulak

MSD9859L8473

HWY 45N

Shugulak Co, 39361

TRI (Toxic Release Inventory System)

see to
the Mason Co
in Mississippi

* Delta Mason Brick

MSD003381260

MS HWY 14 Rt 4

Mason Co, 39341

Lat: 33° 5' 25" , Long: 88° 46' 37.9"

TRI (Toxic Release Inventory System)

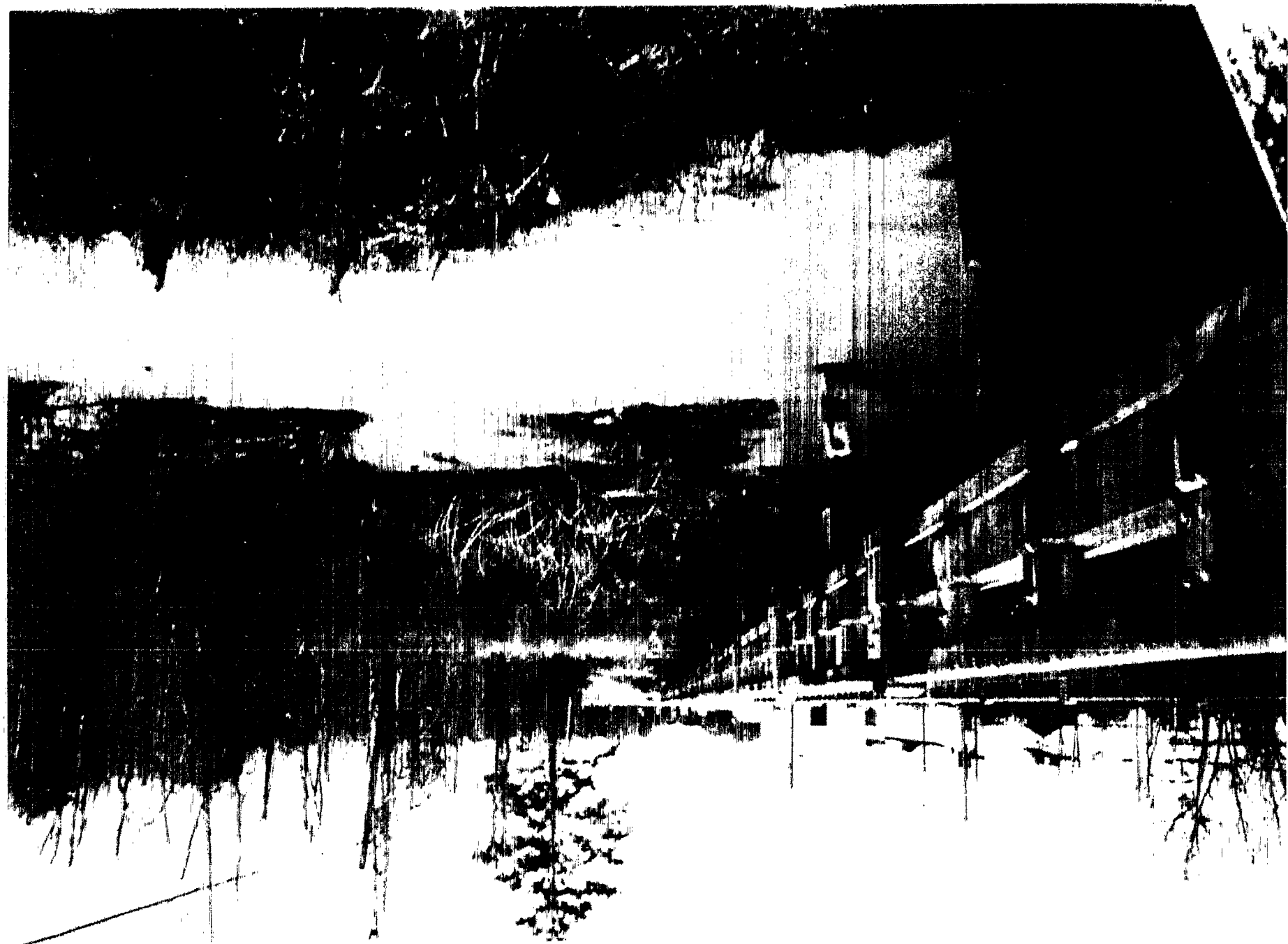
Brian

The Delta Brick Site in Marion has been a problem for approximately 5 years. A man named Curtis Nicholson has been complaining about lead contamination on his property. Attached is a letter from our legal staff outlining past events regarding this site. David Lee of our RCRA Generator section has been overseeing the site due to lead contaminated soil pipes. If you need anything further, give me a call Philip

7694538

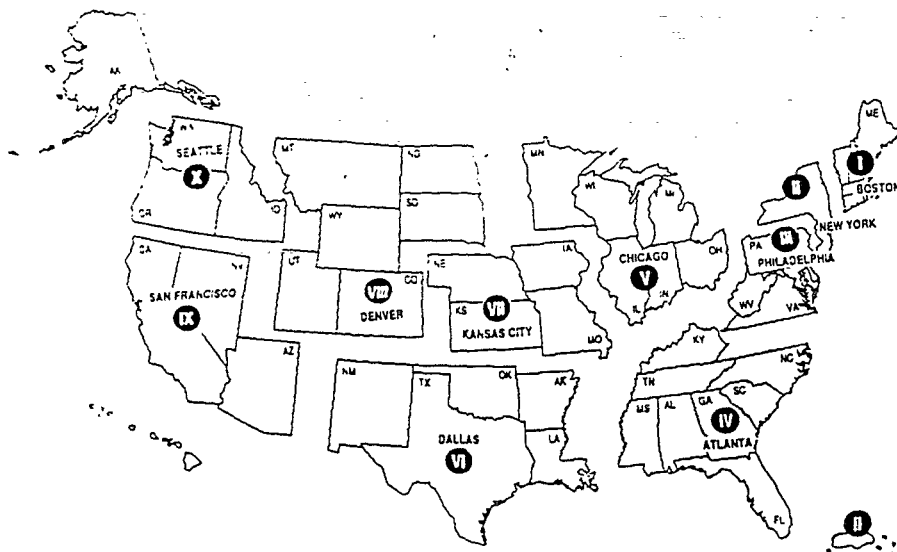












Region I

Regional Administrator
U.S. Environmental Protection Agency
John F. Kennedy Federal Building
Room 2203
Boston, MA 02203

*Connecticut, Maine, Massachusetts,
New Hampshire, Rhode Island, Vermont*

Region II

Regional Administrator
U.S. Environmental Protection Agency
26 Federal Plaza
New York, NY 10278

*New Jersey, New York, Puerto Rico,
Virgin Islands*

Region III

Regional Administrator
U.S. Environmental Protection Agency
841 Chestnut Street
Philadelphia, PA 19107

*Delaware, District of Columbia, Mary-
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Virginia*

Region IV

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U.S. Environmental Protection Agency
345 Courtland St., NE
Atlanta, GA 30365

*Alabama, Florida, Georgia, Kentucky,
Mississippi, North Carolina, South
Carolina, Tennessee*

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Regional Administrator
U.S. Environmental Protection Agency
230 S. Dearborn St.
13th Floor - (HR-11)
Chicago, IL 60604

*Illinois, Indiana, Michigan, Minnesota,
Ohio, Wisconsin*

Region VI

Regional Administrator
U.S. Environmental Protection Agency
1445 Ross Avenue
12th Floor, Suite 1200
Dallas, TX 75202-2733

*Arkansas, Louisiana, New Mexico,
Oklahoma, Texas*

Region VII

Regional Administrator
U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, KS 66101

Iowa, Kansas, Missouri, Nebraska

Region VIII

Regional Administrator
U.S. Environmental Protection Agency
One Denver Place-Suite 500
999 18th Street
Denver, CO 80202-2413

*Colorado, Montana, North Dakota,
South Dakota, Utah, Wyoming*

Region IX

Regional Administrator
U.S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

*American Samoa, Arizona, California,
Commonwealth of Guam, Hawaii,
Nevada, Marianas, Trust Territories*

Region X

Regional Administrator
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Alaska, Idaho, Oregon, Washington

**A list of addresses for other
Federal agencies can be obtained
by calling the EPA Regional
Federal Facility Coordinators at
the following numbers.**

Region I	(617) 565-3287
Region II	(212) 264-6723
Region III	(215) 597-1168
Region IV	(404) 347-3776
Region V	(312) 886-7500
Region VI	(214) 655-2260
Region VII	(913) 236-2823
Region VIII	(303) 293-1644
Region IX	(415) 974-7539
Region X	(206) 442-1327

BEFORE THE MISSISSIPPI COMMISSION
ON ENVIRONMENTAL QUALITY

MISSISSIPPI COMMISSION ON
ENVIRONMENTAL QUALITY

COMPLAINANT

VS.

ORDER NO. 2032 91

DELTA BRICK
MACON, MISSISSIPPI
NOXUBEE COUNTY

RESPONDENT

ORDER

The above captioned cause came before the Executive Director of the Mississippi Department of Environmental Quality this day for ex parte consideration under the authority of Section 49-2-13 of the Mississippi Code Annotated (Supp. 1989), and the Executive Director, having heard and considered the evidence therein, and having determined that an Administrative Order should issue prefatory to any evidentiary hearing and without making any final adjudication of fact or law, finds as follows:

1.

The Respondent is subject to Section 17-17-1, et. seq., and Section 49-17-1, et. seq., of the Mississippi Code Annotated (Supp. 1989) and the rules and regulations of the Mississippi Commission on Environmental Quality (Commission).

2.

Respondent owns and operates a facility in Macon, Mississippi for the manufacture of bricks. The firm formerly used lead-bearing color in the manufacture of bricks.

3.

Solid waste containing lead, and possibly other hazardous constituents, may have been disposed in the waste clay piles stockpiled on the property.

4.

Samples collected by the Office of Pollution Control on October 9, 1990, from drainage ditches on the plant property indicate lead contamination in excess of levels that are protective of human health and the environment.

5.

Premises considered, the Executive Director finds that Respondent may have contaminated soil on the plant property, and contamination may have migrated off-site. Therefore, Respondent shall investigate the extent of lead contamination on the site. Additionally, Respondent shall investigate the existence of chromium and barium contamination on the site and identify all containers of waste on Respondent's site and determine whether they contain hazardous constituents.

IT IS, THEREFORE, ORDERED as follows:

Respondent shall conduct the following activities on or before the dates specified:

- A. Within 45 days of the effective date of this Order, submit a workplan, including a sampling and analysis plan and a schedule of work, sufficient to determine the extent of surface and subsurface contamination at the site and the contents of all waste containers on site. All sampling and analysis shall be done in accordance with EPA manual SW-846. In addition to determining the extent of contamination, said plan shall be sufficient to determine if any contaminated soils is hazardous, as defined by the Mississippi Hazardous Waste Management Regulations.
- B. Within 30 days of approval of the workplan by the Department of Environmental Quality (DEQ), begin field implementation of the plan.
- C. By the date or elapsed time specified in the workplan, complete all field activities described in the workplan.
- D. By the date or elapsed time specified in the workplan, submit to DEQ a final report of all activities conducted in accordance with this Order.

If aggrieved by this Order, Respondent may request a hearing before the Commission by filing a sworn petition with the Commission in the manner provided by Section 49-17-41 of the Mississippi Code Annotated (Supp. 1989).

Numbers 11 and number 12 will be from the brick piles right underneath the paved area. Those will just be soil samples.

When I left Dave Lee they had 3 more to do. All 3 on the brick plants property.

I just had lunch with Larry Johnson who took the water samples. We ran into each other eating in Louisville. Larry tells me that in his opinion, not even relying on lab samples, that the company is in violation of their permit now, they're supposed to have a holding pond capable of holding a large amount of water on the west side of the effluent; they don't have one. He's going to make a note of that. May end up citing them. Larry also informs me, based on his experience and without lab results, that he believes that Boral bricks has just inherited a mess that they're responsible for; that the company has for years been dumping lead and numerous other chemicals out on Curtis's property without any permits or easements or anything else. Larry will be a hell-of-a-great witness to call for Curtis. Larry appears to feel very strong about companies who discharge hazardous waste on other people's property. We talked about a fish kill he'd just investigated and how the particular company he was investigating just callously polluted a stream and pond on an individual's property, killing that person's fish. He talked about how he would like to be able to carry his kids to fish and swim in areas like that, but due to certain companies you can't do that any more. Larry seems more responsive to me than Dave does. Dave Lee doesn't appear to be all that enthused about trying to hang the brick company, but he did mention to me on a couple of occasions today where he thought we'd get the highest lead samples from, and if we didn't get them there, then we'd move and get them somewhere else. All that sounds real positive, but only as positive as you can get a response out of Dave Lee. On the other hand, Larry Johnson was not as concerned with the lab results as the permit violations he feels the brick plant is involved in.

I didn't get to talk to Curtis before I left. I thought he was ahead of me, but he must have been behind me, so I need to fill him in on my conversation with Larry Johnson.

ul\curtis

1. Introduction

Delta Brick owns and operates a kiln dried brick manufacturing plant near Macon, Mississippi. The location of the plant is shown in Figure 1 and a site plan is presented in Figure 2. As a result of a site inspection on October 10, 1990 two small unpermitted wastewater discharges were discovered. Further investigation revealed that the wastewater discharges consist of small quantities of wastewater generated from several sources including brick saw cooling water, slurry water, wastewater generated from the cement mortar coating process as well as some effluent from four on-site septic tank systems.

Subsequently, on April 10, 1991, Delta Brick submitted a NPDES permit application to the Office of Pollution Control for the two wastewater discharges. As a result of the permit application Delta Brick was issued a draft NPDES permit on June 1, 1991 to discharge its wastewater to an unnamed tributary thence to the Noxubee River. Due to the intermittent flows in the small, unnamed tributary which serves as the receiving stream, very stringent discharge limits were included in the draft permit. A copy of the proposed NPDES permit is enclosed in the appendix of this report.

Once the draft NPDES permit was issued, Delta Brick entered into Administrative Order No. 2044 91 on June 7, 1991.

The first condition of this Order required Delta Brick to construct a detention pond and containment dike in order to contain all contaminated water on the plant property until it was diverted to the waters of the state. This requirement of the order was met by using an existing on-site detention pond and constructing the appropriate levees to control the wastewater flow prior to discharge.

The second condition of the order requires Delta Brick to submit an engineering report which addresses a plan for achieving compliance with the NPDES permit. This report has been developed to fulfill the requirements of this condition of the Administrative Order.

The first part of this report addresses current conditions at the plant site. Existing water use patterns are analyzed in order to estimate the quantity of wastewater generated by the processes and personnel at the plant. Existing wastewater treatment and collection facilities are described in detail so that the physical layout of these facilities can be considered. The wastewater generated at the plant is categorized into two distinct groups and the wastewater characteristics for each group are discussed based on analytical data from samples taken from the drainage ditches.

FINISHED PRODUCTS

Tannergas
Rolmark Roller Stencil Inks
Brown mortar
Green mortar
Buff mortar
Red mortar

BURNING

Shell Darina-Grease 2
Rock Wool insulating cement-ONE SHOT
Sairbond
Inswool Blanket and Inswool Bulk
Castable #2 A P Green
AW 68 3000 Hyd Oil Specialty Oil Co.
Z-2000 (Insulating Firebrick)
Z-2300 (Insulating Firebrick)

QUALITY CONTROL

Calcium Carbide



EMERGENCY RESPONSE
AND REMOVAL BRANCH
U.S. EPA REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365
PHONE: 404-347-3831
FAX #: 404-347-4484

REGIONAL RESPONSE CENTER

FACSIMILE TRANSMITTAL SHEET

TO: Mel Carlock Robert Byer

TELEPHONE: _____

FROM: B. Rosen EPA

TELEPHONE: _____

NUMBER OF PAGES INCLUDING COVER SHEET 3

MESSAGE:

Draft info on Nicholson
property

IF THE FOLLOWING MESSAGE IS RECEIVED POORLY OR INCOMPLETE, PLEASE
NOTIFY SENDER.

Mel Carlock/Robert Byer

Here is the information you requested regarding EPA's initial investigation into alleged soil contamination near the Boral Brick facility in Macon, MS. I'm sending you this draft information as a courtesy. Since it is not a formal report, do not release the it in this form, although you are free to use the information as you wish.

EPA and its contractors conducted a very brief investigation into alleged soil contamination on August 2, 1995. On that day, we accompanied Mr. Nicholson into the woods to the north of the Boral Brick facility and, using a hand-held field screening instrument called an "X-Met", took approximately 15 readings over several acres. The "X-Met" is an older, hand-held field screening instrument designed to detect the presence of metals in soil. Newer instruments are significantly more accurate but none were available on this date. Due to concerns about instrument accuracy, we collected eight soil samples for confirmation sampling. These samples were later analyzed at an EPA mobile lab trailer.

During our August 2 sampling trip, the X-Met readings indicated lead contamination levels from 800 to 9,000 parts per million (ppm). When samples were later run through our lab trailer instruments, results ranged from "non-detectable" through 261 ppm. To place this in perspective, EPA soil cleanups frequently use 500 ppm as the cleanup goal. In other words, after our cleanups, there may still be as much as 500 ppm lead in the soil. The level of contamination found in this instance would not be sufficient to cause EPA to take action and in fact, is not high enough to be a significant health threat.

Based on my review of aerial photos and surveys of Boral's property, I do not believe we actually sampled soils on Mr. Nicholson's property as it lies further north than we visited. This poses some problems but if we assume the brick factory to be the potential source of contamination, we would expect to find higher levels of contamination at the source. Since we found no significant contamination on Boral Brick property, we wouldn't expect to find any on Mr. Nicholson's. This isn't flaw-free logic but future EPA investigation will provide more conclusive information.

EPA intends to conduct a more thorough investigation at Boral Brick. Additional sampling will take place and those results will enable us to quantify contamination and threats to human health and the environment.

Here are the results of the eight soil samples we obtained
on August 2:

Sample 1: 261 ppm	Sample 5: 34 ppm
Sample 2: 58 ppm	Sample 6: 12 ppm
Sample 3: 54 ppm	Sample 7: 0 ppm (non-detectable)
Sample 4: 57 ppm	Sample 8: 16 ppm

Call me if you need more information.

Bob Rosen,
On-Scene Coordinator
EPA Region IV
345 Courtland Street N.E.
Atlanta, GA 30365
404-347-3555, extension 6128.

